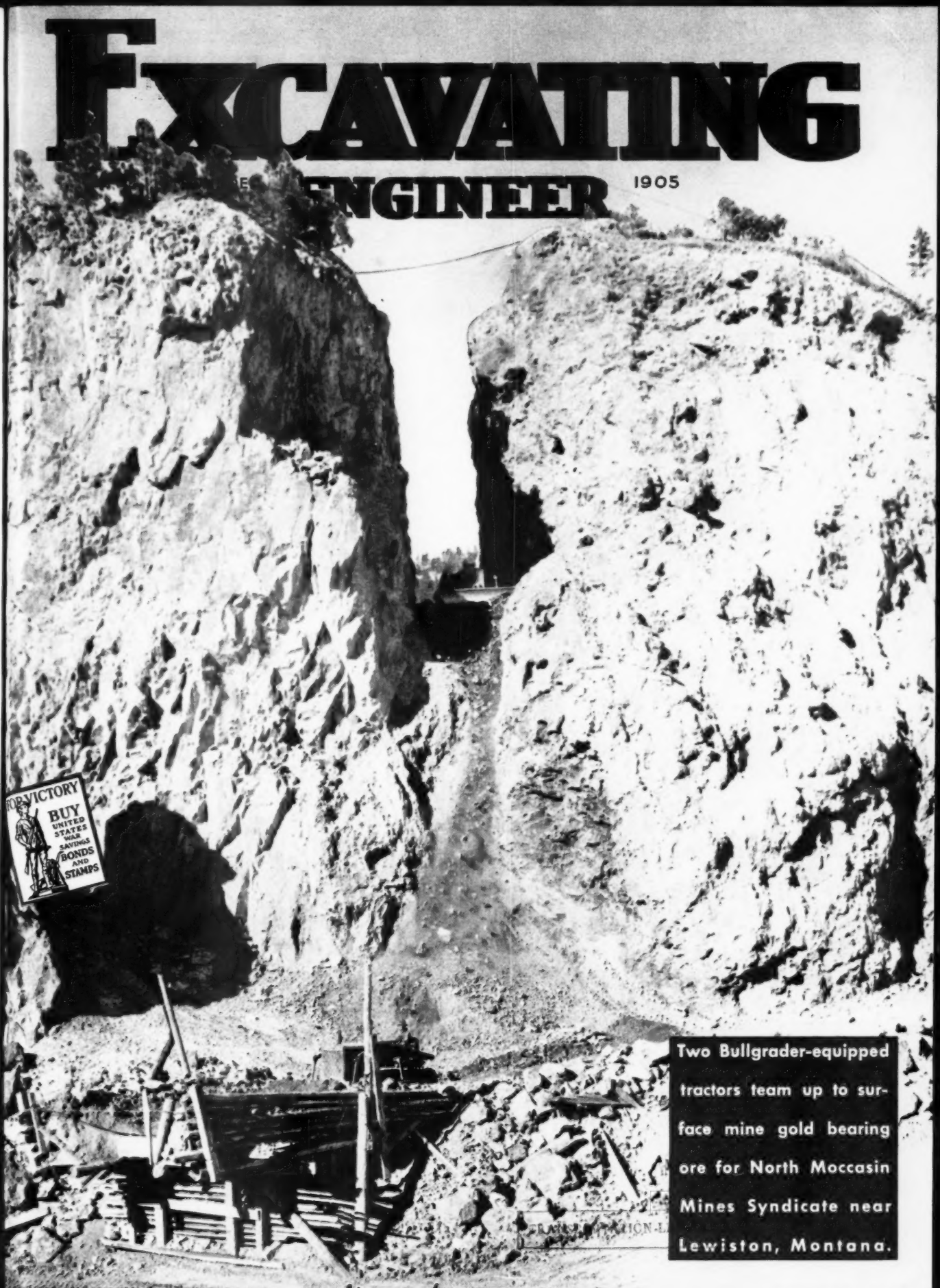
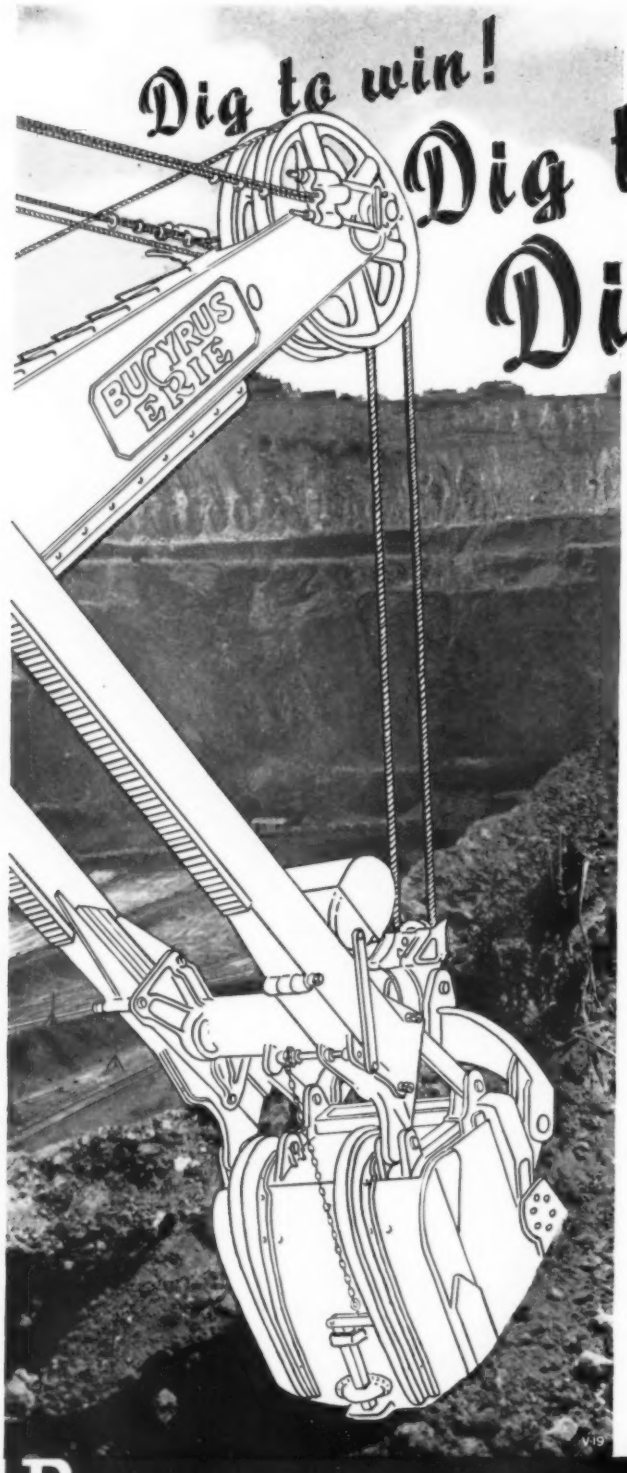
EXCAVATING ENGINEER

1905



Two Bullgrader-equipped tractors team up to surface mine gold bearing ore for North Moccasin Mines Syndicate near Lewiston, Montana.

Vol. XXXVI November, 1942 Number 11



Dig to win!

Dig to win!

Dig to win!

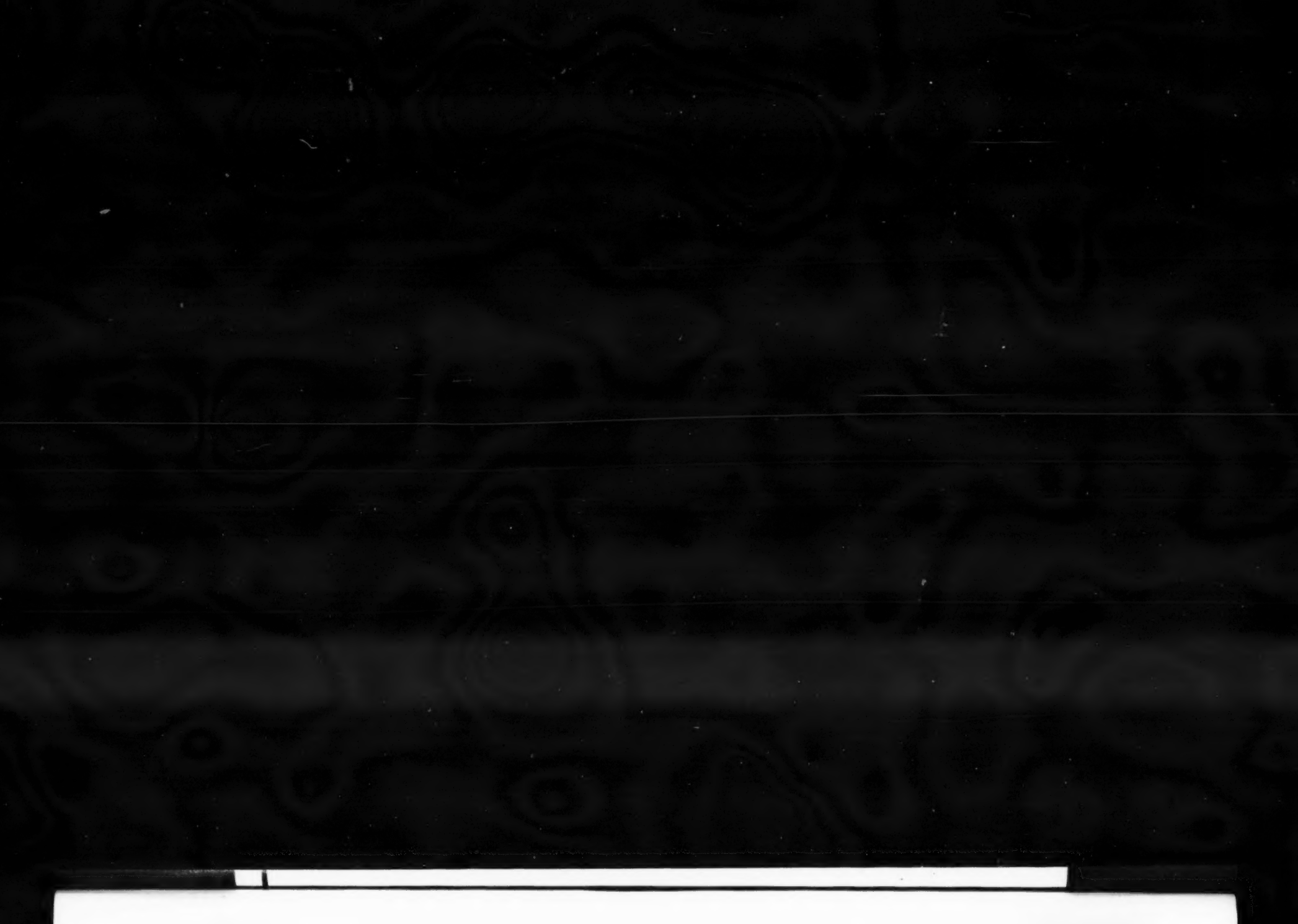
This is a war of industry—to win, every machine must produce faster than ever before. Here are some suggestions that may help you dig faster so Uncle Sam can win faster:

1. Use two truck spot where possible.
2. Spot in line with arc of swing.
3. Spot so load swings over from rear of truck. Don't swing over cab.
4. Swing out from bank as soon as dipper or bucket is fully loaded.
5. Keep swing short . . . spot hauling equipment in close.
6. Try to get a full dipper or bucket every pass, as well as to fill every truck or car, but do not overload.
7. Keep close to your digging — don't "stretch" to reach it.
8. Watch your lubrication to avoid maintenance. Watch your maintenance to avoid lost time.
9. Keep that steady pace which means no slowdown at end of shift.

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

Enlarged reprints of this ad are available for your bulletin boards. In the reprints, the Bucyrus-Erie signature is omitted to leave room for your own name. Write for your copies.



EXCAVATING ENGINEER

FOUNDED 1905

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Front Cover

Two Bucyrus-Erie Bullgraders mounted on International Trac-TracTors are moving 500 tons of gold bearing ore per seven-hour shift as they surface mine an area near Lewiston, Montana, for the North Moccasin Mines Syndicate.

Battleships Are Born In Minnesota **546**

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Published Monthly by THE EXCAVATING ENGINEER PUBLISHING COMPANY, South Milwaukee, Wisconsin, U.S.A.

F. O. WYSE, *Manager* — ARNOLD ANDREWS, *Assistant Manager*
D. B. REED, JR., *Editor* — M. J. BARGENQUEST, *Associate Editor*
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CCA Member Controlled Circulation Audit

Regular subscription: 25 cents per copy, $2.50 a year; Canada, subject to publication policy, $3.50 per year. Special subscription: Upon application on card inserted in this number this publication will be sent frequently (not regularly) free of charge, to companies, executives and supervisors engaged actively in the industry of excavation.

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FAST DIGGING . . . H

Bucyrus-Erie 4-WHEEL SCRAPERS

Bucyrus-Erie 4-Wheel Scrapers are definitely faster and easier to load. That's one of the important reasons for their phenomenal output on vital war dirt-moving jobs . . . it's one of the reasons they can stand the punishment of staying on those jobs three shifts a day week after week without giving in.

TEAM WITH THE TRACTOR — Bucyrus-Erie Scrapers are carefully proportioned relative to the size tractor with which they are used. This is extremely important in obtaining full loads because a scraper that is too wide offers too much resistance to the pull of the tractor; a bowl that is too long will not fill properly at the rear.

LOAD BOTH APRON AND BOWL — The cutting edge is located at a point between front and rear wheels where it loads both bowl and apron — assures full loads every time. Sides of bowl carrying frame extend ahead of cutting edge to prevent side spillage.

DIRT "BOILS" FOR EASY LOADING — The double-curve cutting edge (curved both vertically and horizontally) boils the dirt upward, just as the moldboard on a plow does. The rolling dirt enters in a vertical column, rises up through the load, rolls out on top and falls over into both apron and bowl.

SHORT DISTANCE LOADING — MINIMUM DRAWBAR PULL — Loading is accomplished in short distances because the last dirt entering the bowl doesn't have to push and pack the whole load in order to get in . . . therefore less tractor power is required.

BREAK UP DIRT — The "boiling" action agitates the dirt and breaks up the lumps to reduce voids and give full loads. This broken-up dirt also rolls out quickly and easily when dumping.

for BUCYRUS ERIE TRACTOR EQUIPMENT

SEE YOUR INTERNA

How to choose and use

WIRE ROPE SHEAVES

Practically every piece of wire rope on a "running" job operates over sheaves. By choosing sheaves which are exactly suited to the job, and then keeping those sheaves in good repair, the service life of the wire rope can be greatly lengthened. Here are some simple tips that have been tried and proved in service:

1. Check groove diameter—Make sure that the sheave groove is large enough so that it doesn't pinch the rope. The rope must seat freely down into the bottom of the groove. If it rides the sides of the groove, pinching and abrasion will result. Unequal strains will be set up. Much of the service life built into the rope will be lost.

For best results, observe the tolerances listed in the following table:

Nominal wire rope diameter	*Minimum groove tolerance*	*Maximum groove tolerance*
0 to 3/4"	+ 1/32"	+ 1/16"
13/16 to 1 1/8"	+ 3/64"	+ 3/32"
1 3/16 to 1 1/2"	+ 1/16"	+ 1/8"
1 9/16 to 2 1/4"	+ 3/32"	+ 3/16"
2 5/16" and larger	+ 1/8"	+ 1/4"

2. Check sheave diameter—The larger the sheave, the longer your wire rope will last. When a rope pulls sharply around a small-diameter sheave, it is subjected to severe bending and crushing. This tends to make the rope "go out of round," causes wear on outside wires, and stresses the various parts of the rope unequally.

It should be remembered that certain machines and equipment must of necessity be designed with smaller sheaves than indicated by best sheave practice. This does not indicate poor design, but means simply that, all factors considered, the disadvantages of smaller sheaves are outweighed by advantages in other features of the design.

But whenever there is a choice between a small sheave and larger one—*the larger diameter sheave should be used.*

3. Keep grooves and flanges smooth—After a sheave has been handling heavy loads for some time, the imprint of the rope lay is apt to be worn into the groove of the sheave. A wire rope, working over this sharp-edged imprint, is subject to abrasion and loss of operating efficiency.

If a new rope is put in service over such a sheave, its lay will not fit into the imprints and the "chewing" or "filing" action will be greatly increased. Even if a new rope is not installed, the old rope will be badly abraded as its lay lengthens and enlarges the depth and length of the imprint.

The best way to prevent sheave grooves from wearing prematurely is to select a sheave made of the proper material. Manganese steel sheaves (which are now difficult or impossible to get) are the best all-around sheaves available. Other alloy steels have also been used with success.

However, if you cannot get special sheave steel, the next best thing is to take care of the sheaves you do have. Inspect the sheave grooves frequently. If evidence of wear develops, smooth up the grooves immediately in accordance with groove tolerances which appear in the foregoing table. You will be more than repaid for the effort in longer sheave and rope service and in more efficient operation.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

Iron ore, three and one-half million tons of it, will be Butler Brothers' 1942 contribution to the country's raw material supply of the stuff so essential to the manufacture of the tools of war. Here's how the largest independent supplier of iron ore on the range is making good its production promise

LONG BEFORE MAN knew the treasure that awaited beneath the green of these rugged woodlands, a tribe of Chippewa Indians chose a name for the one-hundred mile formation that extends its one to three mile irregular width in a northeast direction near the toe of Lake Superior. They called this portion of Minnesota typography "Mesabi," which in the Chippewa language means "giant." Although this range wouldn't be termed "giant" by anyone who has seen really mountainous country, it had the highest elevation of any place between Hudson Bay and the Mississippi River and so impressed the local indians. Although the men of Chippewa just hadn't been around as far as mountain ranges were concerned, they unconsciously chose the right name for this Minnesota iron range since it truly ranks as a "giant" among the nation's economic resources.

Ever since 1866, when the presence of iron ore on the Mesabi Range was first mentioned by Henry H. Eames, the country has looked in this direction for the majority of the stuff so essential in the manufacture of the tools of civilization.

Now that the country is at war, this inland treasure chest of iron ore is of increased importance since iron is a basic material in the construction of the ships, tanks, guns, shells, and various other tools of war that will mean ultimate victory for the United Nations.

Comparison of the Mesabi

• Left: A Bucyrus-Erie 120-B loads out iron ore to a Euclid truck at the Harrison mine. Below: Horizontal drilling operations at the Kevin mine are carried on with the assistance of a Parmanco drill.

• Above: A view of Butler Brothers' Patrick concentrator as seen from the top of a washed ore stock pile. Right: Old spoil material in a dry sludge bed is loaded to a conveyor belt by a Bucyrus-Erie 43-B for further benefication.

Range's 1,180,421,711 gross tons* of production since it first started shipping ore to that of the total Lake Superior district's production of 1,932,526,924 tons gives some idea of the amount of iron ore this one range is supplying to the country's blast furnaces. For further comparison; of the 80,747,859 tons produced by the district in 1941, 59,772,543 tons came from the Mesabi Range.

• Below: Equipped with a 4-yard dipper, a Marion 4160 strips overburden at the Kevin mine. Right: One of the Butler Brothers fleet of 42 Euclid trucks rolls along a haul road at the Galbraith mine with 15 tons of iron ore aboard.

• Left: Hub of the company's efficient maintenance program is this completely equipped shop at Cooley. Above: A Caterpillar self-powered grader cleans up the pit floor at the Harrison mine.

'42 Production Goal

Among the many organizations engaged in recovering this important metal from the Mesabi Range, Butler Brothers Company is the largest independent supplier of iron ore in the Lake Superior District. During 1941, this organization handled 6,666,384 tons of crude ore. As of September 1, 1942, the company had accounted for 5,055,902 tons and was well on its way to a 1942 goal of 8,000,000 tons of crude ore. This amount of crude ore will produce over 3,500,000 tons of ore concentrate for the steel mills.

Back in 1900, the Butler Brothers consisting of Walter, John, Cooley, Bill and Emmett came to northern Minnesota and recognized the tremendous wealth and resources that awaited an enterprising mining company. Early stripping activities during these years pioneered the way for the present far-sighted and progressive measures that mark the company's current ore mining operations on the Mesabi and Cuyuna Ranges.

Development on the range as a whole was closely connected with these early stripping operations of the Butler Brothers Company. Working various mines on the range and constantly improving its methods, the company was one of the leaders in modernizing the methods of producing iron ore. Developments in washing plants by the company were started in 1915, with the building of the Harrison mine plant. This plant, as well as the Patrick mine plant completed in 1917, were of the simplest type. Screening and washing operations were performed by a conical screen, a 25-foot log washer, an

*All tonnage figures mentioned in this article are gross tons equaling 2,240 lbs.

• General view of ore loading operations at the Galbraith mine. Euclids loaded by the Bucyrus - Erie 120-B at the left are hauling to the screening hopper at the right. The hopper feeds the conveyor belt which leads to the washing plant at right background.

18-foot turbo and corrugated vibrating tables. This equipment was based on the theory that iron would follow along the bottom of the corrugations while the sand would be washed over them.

In 1924, Butler Brothers improved this process by discarding the tables and putting in classifiers which enabled them to handle any material under ¼-inch. This meant the installation of a Dorr bowl classifier into which materials under ¼-inch flowed. In this process the heavy iron material dropped through, while the lighter materials consisting of sand, light gravel and other waste products were caught by the swirling motion of the water in the bowl and thrown out as tailings to a waste pond. This was a distinct improvement over the old straight-washing plant because it was a simpler operation and much more material could be handled in the same amount of time.

Perfecting Jigging Procedure

Further improvements were made by Butler Brothers in 1929, when they installed Stone-McLanahan jigs for the purpose of treating coarse ore containing taconite, a lean iron-containing rock associated with the range's iron ore deposits. Crushers and vibrating screens were also installed at this time, thus establishing a washing and jigging plant. The crushers reduced 6-inch material to minus 1¼-inch, preparing it for the jigging operation. The jigging process submitted the ore to a pulsating water current. This unit consisted of a tank with a plunger in it. The ore was dropped on a screen and the pistons sucked in the water which was then pumped up under the bedded material lying on the screen, causing a separation of the heavier ore from the lighter waste material. The jigs took care of the larger sizes and the classifiers took care of the finer ones.

This method was a big step in the industry since it made available a much greater quantity of merchantable ore than ever before. A further step in the modernization of the ore separation process was made in 1930, when Butler Brothers installed three Rheolaveur plants which were designed to take care of the products that could not be handled by the Dorr classifiers. The low grade ore still remaining in the waste thrown out by these classifiers is further reclaimed in these plants.

Another step of improvement in this process of iron ore benefication was made in 1939, when Butler Brothers put into use a cone differential density plant which replaced the Stone-McLanahan jigs and proved its worth in 1940, by producing about 500,000 tons of salable ore from the old tailings of the Stone-McLanahan jigs. This system is termed differential density. The process depends on the difference between the density of the ore and tailings and the density of a ferro-silicon medium. This medium is a mixture of ferro-silicon and water which, at the proper density, allows iron ore to float and waste rock to sink. For example, a one pound piece of ore would sink in this mixture, while a 20 pound rock would float. This latest development in treating iron ore makes possible the retreatment and sale of material that was formerly classified as waste.

One of the more or less stubborn problems that Butler Brothers were faced with, was the establishment of a system whereby they could handily dispose of rock or oversize material from their washing plant. In the winter of 1940, a solution was reached in the construction of a screening plant in the pit which was constructed and put into operation in the spring of '41. This plant removed oversize above 5½-inches, since material over this size is rejected because of the low percentage of iron content. This plant meant another large increase in ore production since heretofore raw material over 3½-inches had been rejected as not being able to be treated.

Changing to Truck Haul

Next to its constant effort to increase the efficiency of ore separation methods, Butler Brothers Company has recognized the importance of modern equipment and methods in the excavating and hauling operations entailed in their various mining operations. One of the most interesting developments in this company's hauling practice has been the substitution of trucks for rail haul. Up to 1937, ore trains were used exclusively by Butler Brothers in their mines. As stripping pits became deeper and narrower and the hauling inclines became great-

er, it became apparent that some new method to replace train haul would be necessary. After considering electric cars, tractor-towed wagons, and trucks, the company, through trial and observation, finally decided upon trucks as the answer to its hauling problem. Seven different makes of trucks were purchased and used by the company in an effort to find the truck best suited to the company's particular hauling needs. In 1938, Butler Brothers standardized on Euclid trucks and today 42-diesel-powered Euclids perform ore and overburden hauling duties exclusively in the Butler pits. Since 1937, when the Euclids were first brought into service, they have moved a total of 14,171,021 yards in 298,133 working hours.

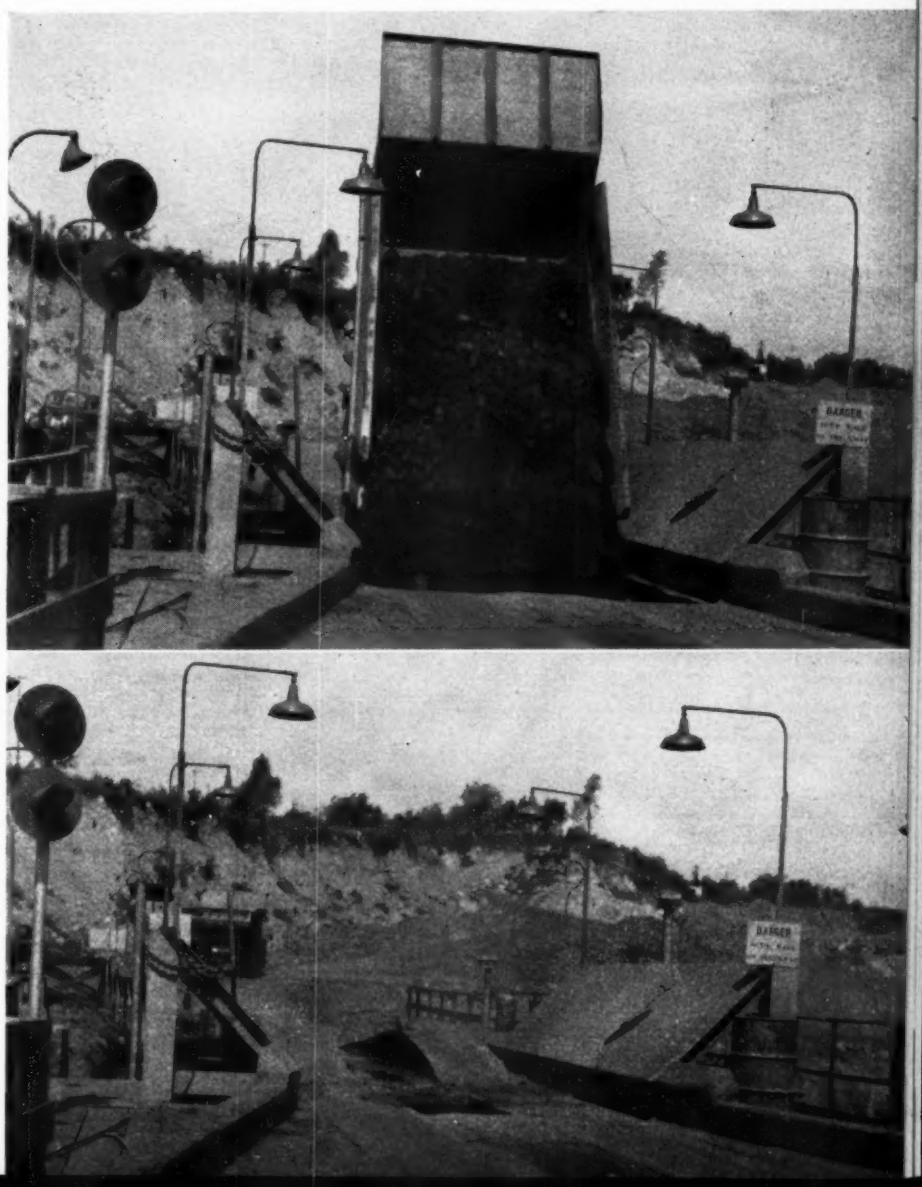
This radical change from rail to truck was only made after careful consideration of safety as well as efficiency factors. The company realized that hazards in truck operation were new and entirely different. However, Butler Brothers' experience to date has indicated that truck operation is less hazardous than rail haul. The company believes that this is because the major employment group engaged to work with the trucks is more skilled.

The Euclids average 15-ton payloads, sometimes carrying gross loads as high as 60,000 pounds. The company has used both single and tandem drive trucks and has experimented with both side and rear dump bodies. The trucks are all equipped with air brakes, hydraulic hoists and in some instances, air booster steering. Hauling cycles vary from one-half to slightly more than a mile, while haul roads, except in a few cases, do not exceed eight per cent grade. Where feasible, return roads on an 18 to 20 per cent grade have been constructed. The company found, at an early stage, that truck safety and truck efficiency went hand in hand. Whenever an unsafe condition or practice was corrected, it immediately influenced the efficiency of the operation. This safety program stressed three factors, namely: personnel, maintenance, and roads.

Personnel for the trucks was carefully chosen. Because of the fact there were very few men in the vicinity that had experience with this size and type of equipment, Butler Brothers followed a policy of training their own employees for this work, selecting them mainly from the locomotive classification. This furnished them with skilled workmen familiar with company practices, and men who had proved themselves reliable. These men were given thorough, careful training and every opportunity to make good. During the training period, the men that felt they were not suited to this work voluntarily asked to be changed to some other occupation.

Another important problem that was met was fatigue. In a well-organized truck operation, neither truck nor shovel operator has any idle time. To reduce fatigue hazards, the company installed more comfortable operator's seats, increased the visibility in the cabs, and changed some of their shovel control systems. On the trucks, the company continually experimented with cab arrangement, seating equipment, gear shifts, drivers seats, etc., except in particular instances and for short periods of time, operations were planned to eliminate backing at the shovel or the necessity of turning on a minimum radius. The importance of these items was borne out by the fact that on actual check, the

(Continued on page 573)



• A "drive over pocket" arrangement at the Kevin mine facilitates truck dumping perations. In the top view a truck dumps its load through the open platform. Bottom view shows detail of closed platform after load has been dumped.

• Three and one-half yards of river gravel hit the specially-designed truck loading hopper as Basalt Rock Company's Bucyrus-Monighan empties a bucket load.

Moving Gravel In The Modern Manner

Basalt Rock Company, one of the West's largest producers of aggregate, employs modern methods and equipment to turn out assorted sizes of rock at the rate of a million tons per year

By ASA LINDLEY

THE SWEEPING defense installation of a potential combat area such as northern California swallow up vast quantities of material. Steel and concrete is consumed in amounts that would, in peace-time, confuse the mathematical mind of a design engineer and even command the respect of the builders of the West's mighty dams.

Dreary sloughs where duck hunters once saw the sun filter through fog from cold blinds, are being transformed into tremendous shipyards by hordes of tanned catskinners and shovel operators who have moved in with their machines to change the landscape according to specifications. Where harvesters once mowed and sacked rolling acres of oat hay, the ammunition storage igloos and structures of mighty arsenals now stand. The P-38's peeling off from formation overhead are from airports which were, before Pearl Harbor, wheatfields and lettuce farms. Big, dull brown Army trucks rumble past, on their way to a depot constructed on a fill that was once marshy tideland.

To supply the needs of this vast construction program, the gravel plants of the area are working 24 hours a day. Machinery is called upon to produce to its capacity without stopping, and methods of operation are being put to the acid test.

Producing Million Tons Yearly

Basalt Rock Company's plant on the Russian River at Healdsburg, California, has long been one of the West's largest aggregate producers, and due to its proximity to vital defense points, it is one of the most important to this war program. Its million-ton-per-year present output is made possible by the surprisingly up-to-date methods put into effect by Superintendent Jim Kennedy and the management, headed by President A. G. Streblow. Although the operation is about 20 years old, it has been modernized and old buildings replaced until today the straight-up timber construction typical of the older gravel plants has disappeared almost entirely.

Necessarily, to feed a plant of such a large output, the excavation system must be correspondingly efficient. The gravel borrow area is located at any point along the Russian River within a distance of one mile either way from the plant. When the job was visited by the writer the material

was coming from a point approximately 1.75 miles downstream from the plant. The flow of the Russian River had been diverted into an adjacent channel by an earth dike upstream, and operations were under way in the old river bed.

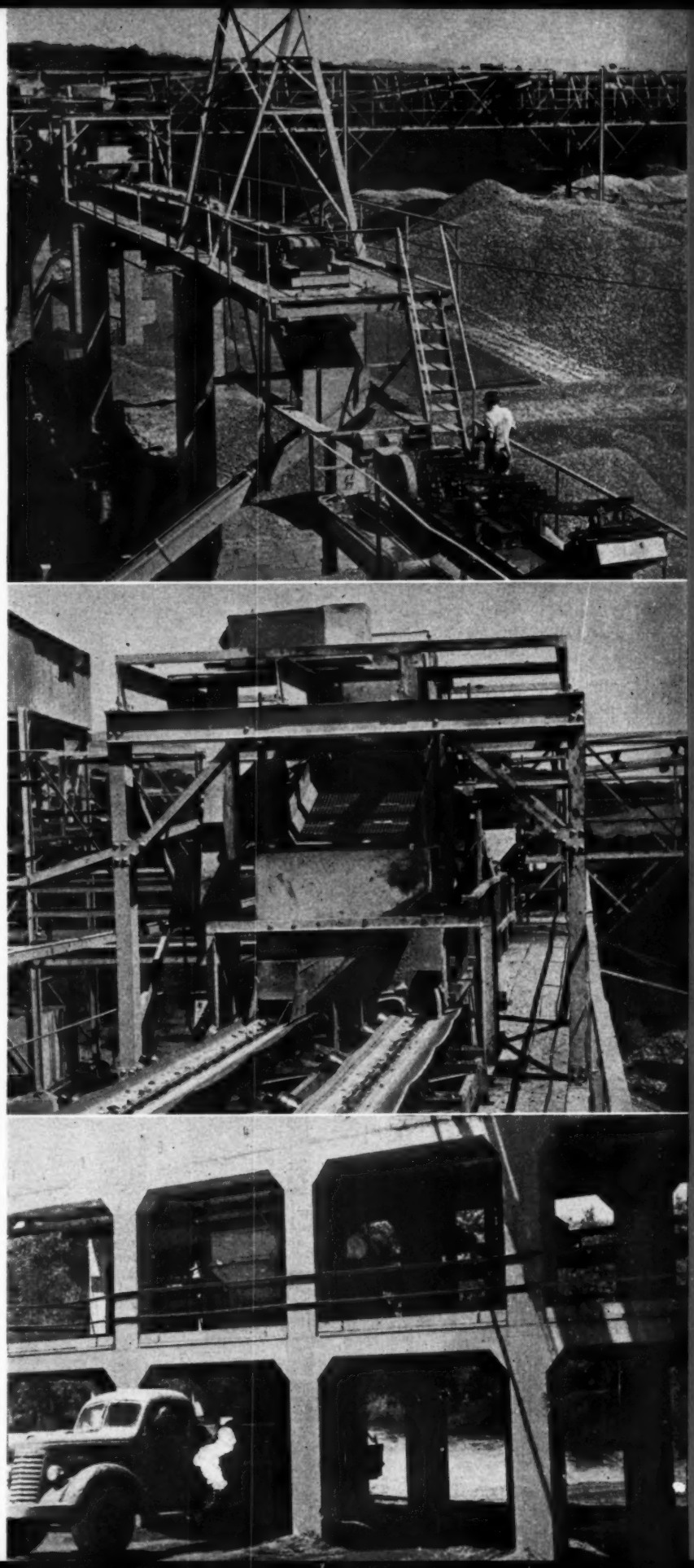
The excavation equipment is different from any encountered in the area and is characterized by big-yardage and fast hauls. A Bucyrus-Monighan 3-W dragline feeds three 13 and two 15-yard Euclid Trak-Trucks powered by Cummins diesel engines. Depending upon the length of haul, anywhere from three to five of these units are used.

This particular excavation team was chosen because the dragline had the capacity to keep the trucks moving without delay and because the large capacity Euclids were capable of high speeds under load. Operating at speeds up to 35 mph, they average 17 minutes per round trip.

The Bucyrus-Monighan walking dragline is all-electric, with Ward-Leonard controls. Equipped with an 80-foot boom, it is digging at depths of 35 to 40 feet. Its Bucyrus-Erie Red Arch and Page 3½-yard buckets are getting very close to a full load with every pass. Bill Berry, who operates the dragline, has encountered a minimum of boulders, and characterizes the material as very uniform and naturally graded in stratas, with occasional sand and gravel pockets. An average of 2,300 yards of material is excavated per shift.

Working 22 hours out of 24, the drag ropes last about 240 hours, while the hoist lines perform for 600 to 800 hours. Maximum hoist cable life to date has been 860 hours. Preformed cable is used throughout on the machine, with one-inch on the hoist lines and 1¼-inch on the drag.

A couple of typical kinks illus-



• **Top: A series of trestle-supported conveyor belts facilitates economical aggregate stock piling operations. Center: Closeup of a shaker screen on the crushed rock trestle. Bottom: A batch of concrete aggregate is loaded to a GMC truck waiting in one of the stalls below a 60-ton bunker.**

trate the intelligent management of Superintendent Kennedy. It was previously the practice to load the Euclids directly with the dragline, which meant waiting while the unit was excavating, swinging and discharging four or five bucketloads. Then Kennedy designed a field hopper which scaled the loading time from three minutes down to just 20 seconds.

Surge Hopper Construction

The hopper, which weighs 20 tons unloaded, is constructed of welded plate steel. It is mounted on pontoons, and may be moved to keep pace with the excavator by hooking lines from a couple of hooks on the pontoons to one of the Euclids. Discharge is through gates which roll on tracks and have a theoretical capacity of 5,000 tons per hour. They are three feet long by two feet wide, and are arranged in series. The gates are air-operated, using the compressor on the Bucyrus-Monighan. It was necessary, however, to install a second, and larger, air tank.

With a capacity of 75 tons, the field hopper has evened out the production of the pit, and by providing surge capacity for the gravel, it allows the excavator to operate continuously, in addition to eliminating the truck waiting period.

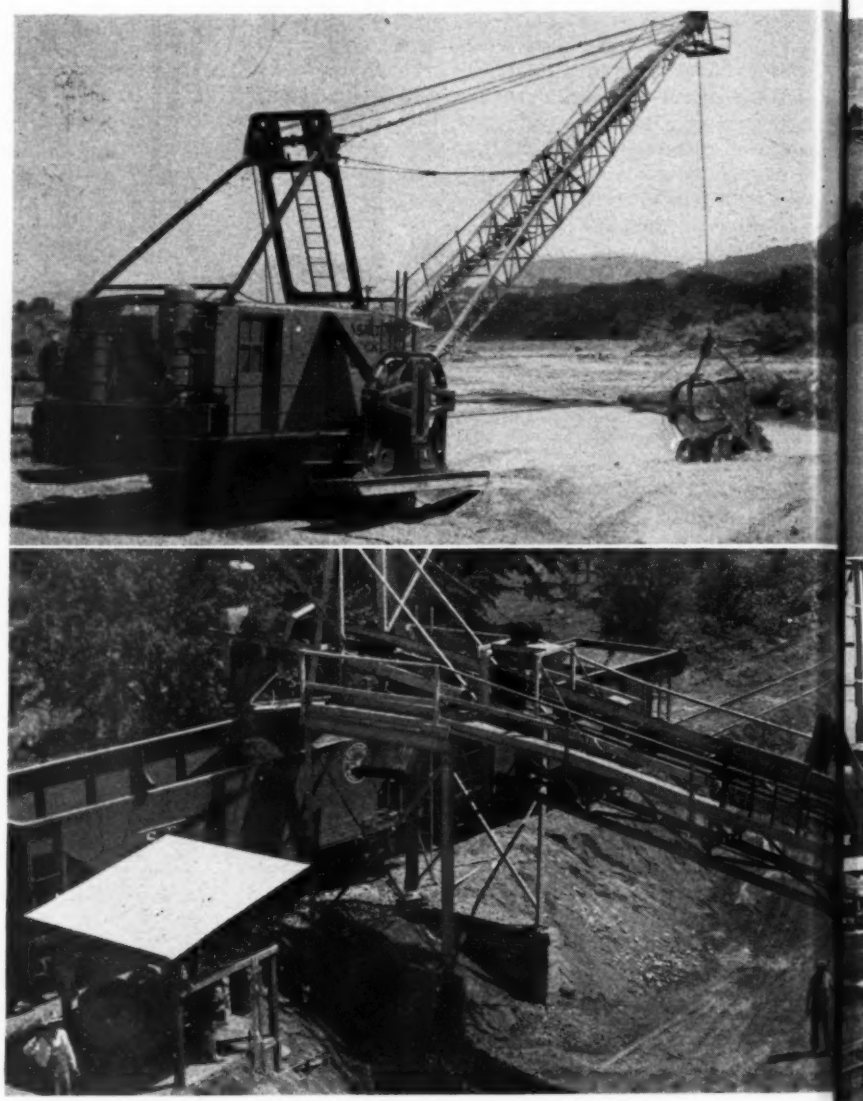
The Euclids drive over the company's private road to the plant. A great deal of water, of course, drains from the loaded trucks onto the roadbed, so they have adopted the expedient of driving European style (on the left side) during the day shift, and American fashion during swing and night shifts. This saves the surface by allowing it to dry out between shifts. An old Austin motor grader is used to maintain the road.

Arriving at the plant, the Euclids bottom-dump into a track hopper equipped with grizzly bars on six-inch centers. The feed from this 70-ton hopper is by gravity through sliding gates at the bottom. No agitating feeder is necessary due to the exceptionally clean nature of the material. Occasionally, however, it may be necessary to clean out the gate with long pinch bars.

Material is reclaimed by a 24-inch belt on 400-foot centers which carries it 350 fpm to the plant hopper. Besides being unusually complete, with facilities for railroad car and truck unloading and for batching concrete aggregates, the plant possesses the unique advantage of being capable of operating its crushed rock machinery independently of the river gravel production. Although the output of crushed rock products is substantial, it does not approach that of the natural gravel, and the company is able to shut down the crushed rock machinery for a good part of each day.

On arriving at the end of the track hopper conveyor, the raw material is discharged onto the first of the series of screens, a 4x10 double deck unit. Here, all plus three-inch rock is scalped off for production of crushed rock, while all material which passes the three-inch mesh of the top deck goes into production of natural river gravel and sand.

Rejects from the lower deck,

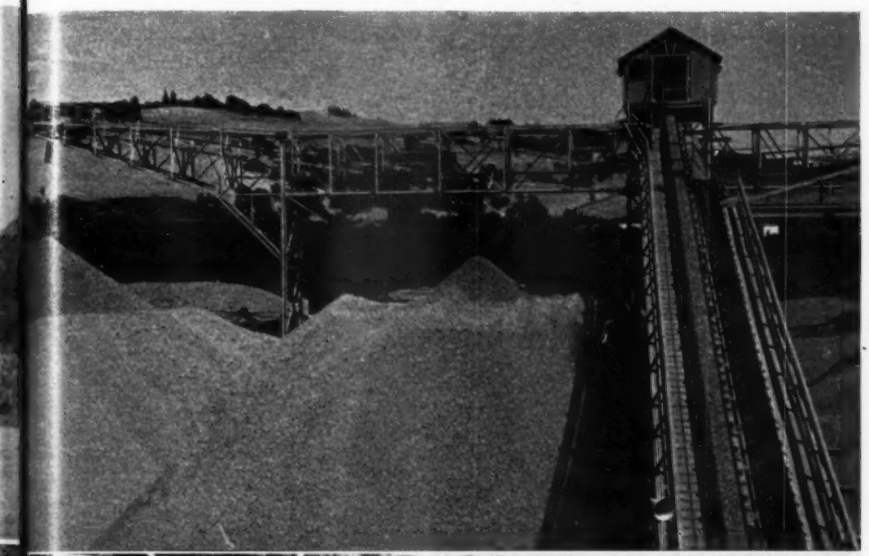


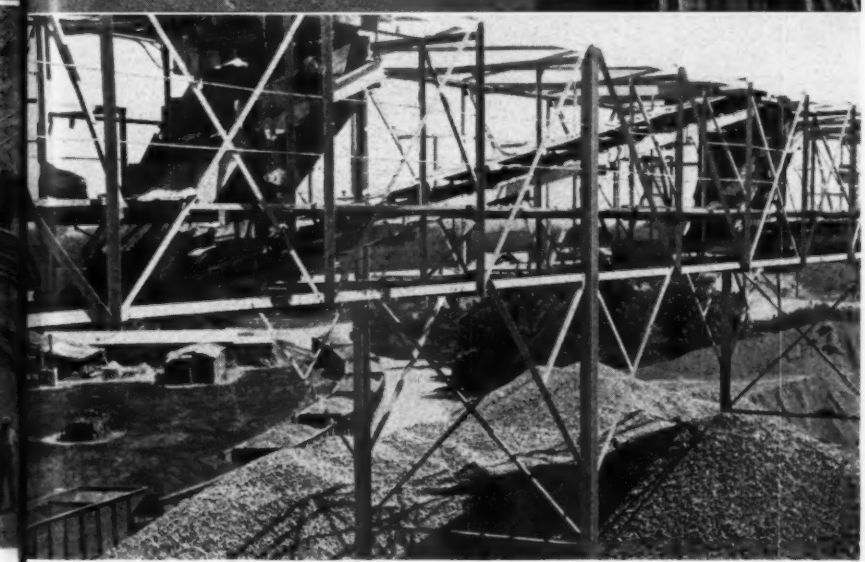
• Top: The company's Bucyrus-Monighan 3-W is working three shifts a day, fishing aggregate out of the Russian river. Bottom: Railroad cars are loaded directly from conveyor belts. The shed (lower left) houses a car puller arrangement for spotting cars.

which has a ¼-inch mesh, are taken to a 300-ton surge bin. Material passing goes to the sand classifying system. From the surge bin, it is taken on a 24-inch by 300-foot conveyor to a second set of 4x10 screens. The top deck has 1¼-inch mesh, and the lower, ⅜-inch. Rock passing the lower deck is taken by a 24-inch belt 40 feet long to stockpile, while rejects from this screen go to a 3x8 single deck unit with one-inch screen. Material scalped from this screen drops directly onto the stockpile, while material passing it is taken on a 24-inch belt, 30 feet long, to its stockpile.

Rock rejected from the 1¼-inch screen falls onto a 24-inch by 40-foot belt to a 3x8 screen with two-inch mesh. Rejects are chuted directly to the stockpile, and material passing the screen goes via a 24-inch by 40-foot belt to another 3x8 screen with 1½-inch mesh. Products of each of these screens form the larger sizes of rock.

• Top: View of part of the aggregate handling system from the crusher house. Bottom: A portion of the river gravel trestle showing how the screening units are built into the trestle frame work.





Crushed Rock Flow

The separate crushed rock system begins when the larger sizes of rock fall from the first 3-inch screen into a 150-ton surge bin located alongside the river gravel bin. When this bin nears storage capacity, the two crushers are started up and the crushed rock end of the plant goes into operation. There are two crushers, a Traylor ten-inch gyratory unit which turns out the coarser sizes and a Rolls crusher for the finer grades. A 24-inch by 250-foot belt carries the product of these crushers to a 3x8 screening unit, with 5/16-inch and ⅛-inch screens. Crushed birdseye is rejected from the ⅛-inch screen and drops onto the stockpile below, while material passing this screen is piped away to another stockpile where it is deposited as crushed rock dust. Rejects from the top, or 5/16-inch, screen, go by a 20-inch belt 30 feet long to another 3x8 screening unit equipped with ¾-inch and ½-inch screens. Material passing these screens goes to its respective stockpiles, the finer material directly, while that rejected by the ½-inch screen is transported to its stockpile by a 20-inch x 25-foot conveyor. Rejects from the ¾-inch screen are conveyed on a belt of the same dimensions to a 3x6 screening unit with 1½-inch screen. Crushed rock passing this screen falls onto the stockpile, while rejects, which are plus 1½-inch slabs, are dumped onto the main gravel belt from the 300-ton bin. Amount of this material is relatively small, and of course does not affect the quality of the river gravel.

Sand which is taken from the first 4x10 screen is passed through a Bodinson sand classifier and onto a 24-inch x 100-foot shuttle belt which runs over the 200-foot long sand stockpile. A 3x8 screen with No. 8 mesh passes plaster sand and retains ⅛-inch to ¼-inch natural birdseye.

A recent installation along the sand trestle is a Link-Belt drag classifier. Sludge from the first classifier contained a good percentage of the finer sizes, so it is now piped to the L-B machine, which recovers it and then drops it onto the shuttle belt.

The plant layout is functional, the only central structure being

(Continued on page 572)

Rolled-Fill Dam

A contracting combine tackles a ten million yard rolled-fill dam job that will bring flood control, power, and irrigation advantages to the citizens of a western state

By FRANK H. SPENCER

Editor's Note: The name and location of this dam, and the names of the constructing contractors have been deleted from this article at the request of the U. S. War Department.

ONE OF THE WORLD'S largest rolled-fill type embankments, has now been under construction a year in a western state.

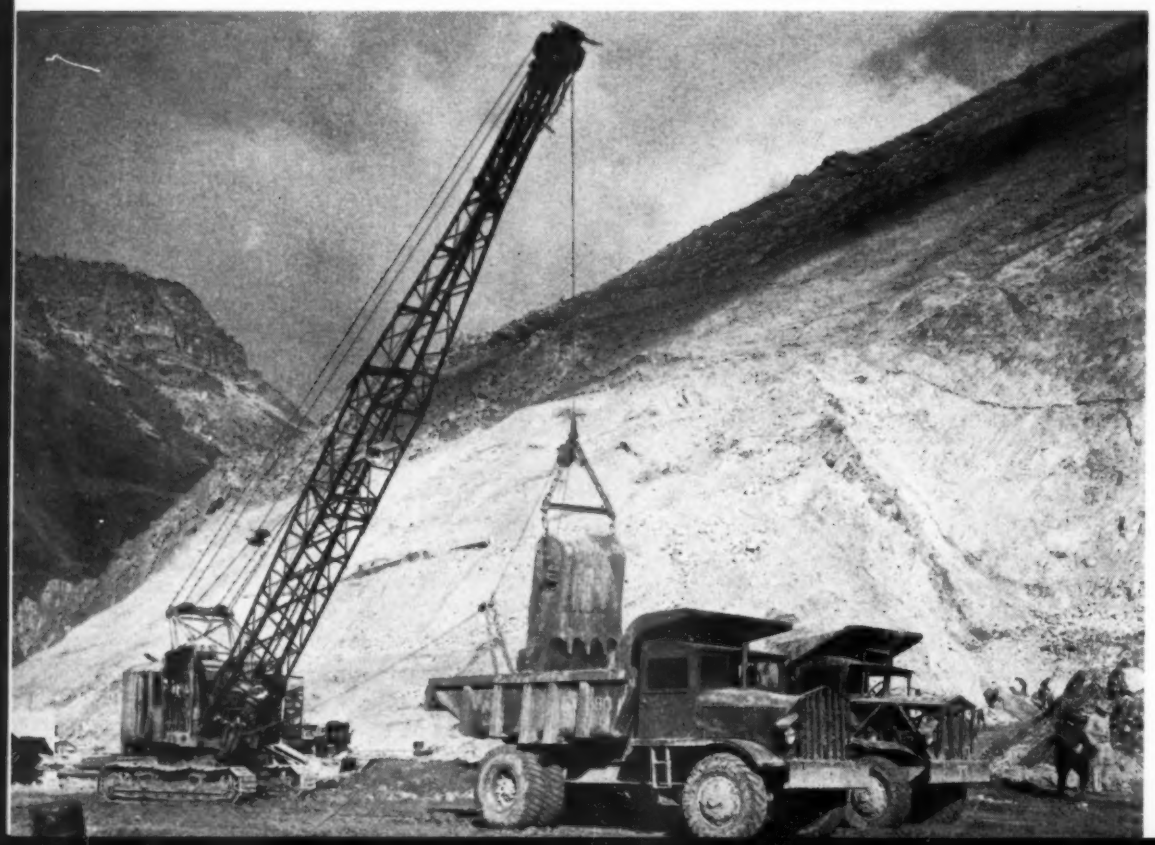
Work on the dam was started August 7, 1941, and construction to September 1, 1942, has been estimated at approximately 30 per cent. The dam will have a crest length of 1,700 feet, including width of one spillway which runs over the left abutment; a crest height of 320 feet above the river bed and 440 feet above the underlying rock formation; and a thickness of 2,800 feet from toe to toe (up and down stream). Width at crest will be 40 feet.

Ten Million Yard Fill

To provide the fill, approximately 10,000,000 cubic yards of earth, rock, sand, gravel and cobble stone are being dug, transported and tamped into the site. The main embankment has been divided into three zones, with the middle section, or core, to be filled with a compacted, impervious material; the upstream zone to be composed of semi-pervious sand and stones under five-inch measurement, and the downstream zone to be of pervious rock material. The center and upstream sections will use 7,500,000 cubic yards of material for fill, and the downstream sections approximately 2,500,000 cubic yards of cobble and rock fill.

Excavation of the foundation, which was completed in October, 1942, entailed removal of 1,300,000 cubic yards of earth to reach the bedrock of decomposed granite 130 feet below the river bed. Now underway is excavation of the spillway and powerhouse sites, with 1,200,000 cubic yards to be removed.

To permit the foundation excavation, crews first drilled a 1500-foot tunnel and outlet works through the left abutment, a slab of mountain around which the river ran in its normal course. After drilling, during which 27,000 cubic yards of rock were removed, the 20-foot-wide tunnel was lined with 8,000 cubic yards of concrete and 4,000 cubic yards of concrete were used in completing the outlet works. This part of the project was finished in May, 1942, when the river was diverted. Total excavation necessary, in-



• A Northwest 80 dragline loads Euclid 10-yard trucks at the downstream end of the dam's diversion tunnel.

Job

cluding the main embankment, spillways and powerhouse, and tunnel and inlet works, aggregates 2,527,000 cubic yards.

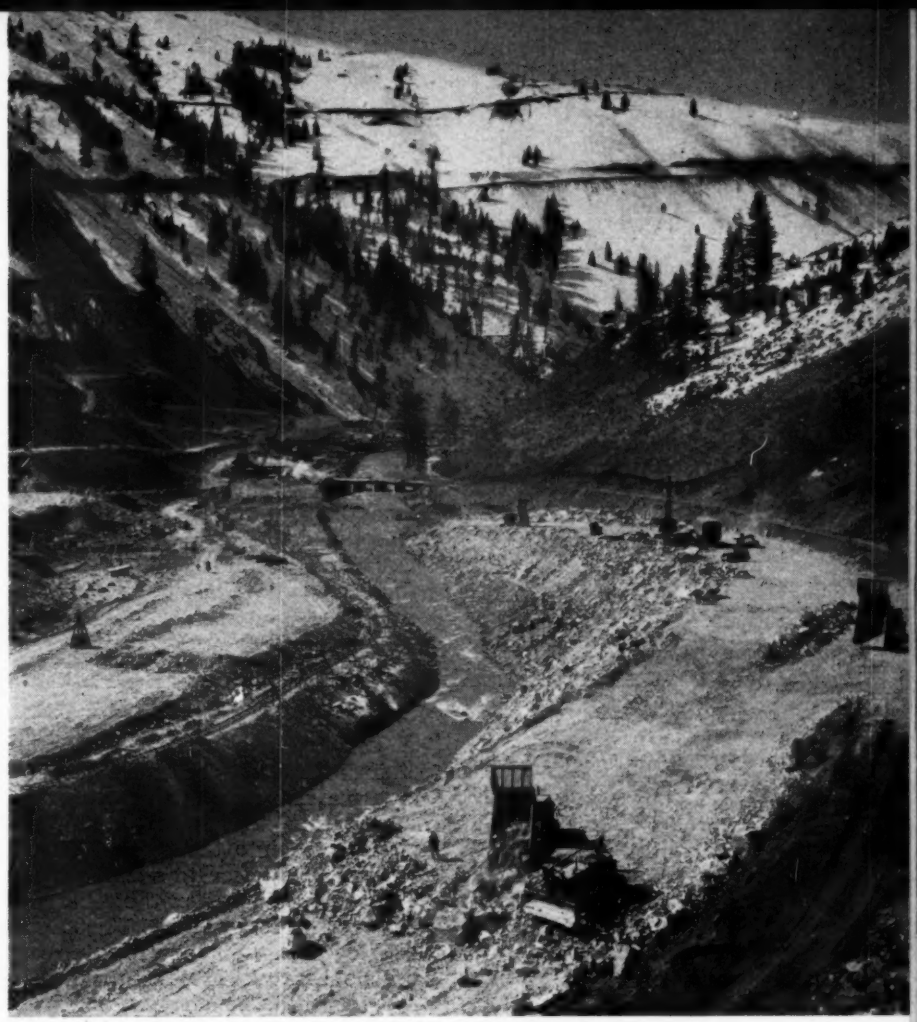
Special features on the dam are many, attesting to the ingenuity of project engineers. Probably the chief example was the installation of a conveyor belt, 7,000 feet in length, over which a large share of earth will be brought for the main fill. The belt runs from borrow pits, 5,000 feet downstream and 900 feet from the bed of the dam's center, to the top of the rim. The belt rises to the top, by means of nine transfers and through three tunnels, to reach the pits located on the left side of the dam. A second conveyor system, from other borrow pits nearly a mile upstream on the right hand side, will be constructed later to furnish rock and gravel for the upstream and downstream dam sections.

When filled, the dam will impound 500,000 acre feet of water covering nearly 14 miles behind the embankment. More than 4,000 acres will be inundated. At the highest level deemed possible, the water will rise to 10 feet below the dam's crest.

The dam, as finally approved, was one of two sites surveyed and examined by the U. S. Department of Reclamation and other government agencies. The other was to the north and west of the location finally chosen.

Flood, Power, Irrigation Project

Proposal for a dam, as a joint flood control, power and irrigation project, was first talked of nearly two decades ago by residents of the state. During the past two years the thousands of members of a water conservation society maintained that such a dam would serve to regulate the flow of water into a reservoir, from which farmers throughout the nearby fertile valley could draw for their crops. In addition, the dam would serve as a flood control unit, preventing the damage which almost annually occurs during the spring run-off. As a more or less incidental benefit, the dam would generate needed electrical power for the area, supplementing the existing supply.



• This interesting general operations view shows the placing of the cobble rock fill in the downstream toe of the dam. The rock is being hauled from the spillway excavation.

Federal officials, including men from the Department of Reclamation, the Forestry Department and the Soil Conservation Service, approved the site in 1939, after completing surveys and general investigation. They set the construction cost of the dam at $13,500,000, of which $400,000 was to be used for changing and repairing discharge gates. The flood control value for the dam was set at $5,050,000; irrigation at $4,650,000, and power at $3,400,000, or a total of $13,100,000.

Main contract for the dam, totaling $10,000,000 and including every phase of construction except securing and clearing of right-of-way, to be done by the Department of Reclamation on small sub-contracts, and the furnishing of generators and turbines for the powerhouse, was let in 1941.

Stripping Dam Site

Work officially began on August 7, 1941, when workmen started construction of a small city to house 1,000 men several hundred feet below the dam proper. In September, the first stripping and clearing for the core trench and the left and right abutments began, and shortly after excavation of the tunnel got under way.

Stripping work was almost negligible, since the site was a natural place for a dam. Only a small amount of sagebrush, trees, roots and some rocks needed to be re-

• General view of the dam site looking upstream. White lines indicate position of completed dam.

moved. In the borrow pits, 200,000 yards of stripping was accomplished. To do the work, six D-8 Caterpillar tractors equipped with bulldozers and scrapers were called into service.

Usable material was dumped upstream from the site, to form a coffer dam for the diversion of water into the intake section of the tunnel. The coffer dam, as another feature of construction, will be incorporated into the toe of the upstream section of the main embankment. Although it is difficult to estimate the coffer dam's final size, it should aggregate about one-tenth of the total necessary for the fill of the upstream and center zones.

After stripping, blasting was undertaken, but this, too, proved to be a minor phase. It is estimated that 1,000,000 pounds of powder will be used during the dam's construction, but up to now only a small portion of that amount has been needed. Light shooting was needed for drilling the tunnel, tunnel intake and inlet structures. A comparatively small amount of powder is necessary, because the main rock found is decomposed granite. No secondary drilling or blasting has been necessary.

Site of the dam is a narrow canyon, approximately 900 feet from bed to rim and 2,000 feet from rim to rim. First major excavation, after the river had been diverted into the tunnel through which it flowed to again join the regular channel on the other side was the removal of 1,300,000 cubic yards of dirt and rock to reach the bedrock 130 feet below the river bed. To do this work, the company used three electric shovels, including one Bucyrus-Erie 120-B dragline and shovel with a 5-yard bucket and two Bucyrus-Erie 100-B draglines and shovels with 4-yard buckets, a Bucyrus-Monighan 6-W diesel-powered dragline with a 6-yard bucket; a Lima 1201 dragline with a 3-yard bucket, and a Northwest 80-D dragline of two yards capacity, both diesels.

The interchangeables were worked as either draglines or shovels as the occasion demanded. All hauling to the coffer dam, stockpiles and waste disposal areas upstream was done by the 32 trucks, including twenty-six 10-yard Euclids and six 25-yard Maxi trucks.

The core trench thus opened was 200 feet wide, extending from one abutment to the other and across the bottom of the river bed, to expose the decomposed rock. Two concrete cut-off walls, each 16 feet in height and ranging in thickness from three feet at the base to nine inches at the top, will be constructed into the sound rock. The excavation will then be replaced with selected impervious materials. A total of 4,500 cubic yards of concrete will be used in construction of the cut-off walls.

Dewatering of the foundation seepage is accomplished by a series of pumps operating in surface sumps which are carried down with the excavation. Maximum to be pumped out has been 5,000 gallons per minute. Now in progress are pressure grouting operations, with cement and water forced into 180-foot holes drilled into bedrock. This will seal all cracks and provide a firmer foundation for the dam. A rock base of hard composition underlies the granite, which averages from six to seven feet in thickness.

Placing Fill

With completion of the main excavation in October, the 7,000-foot conveyor system was put to work. It will run almost continuously, except for an expected shut-down each year between December and April, for four years to complete the main fill. A total of something like 6,000,000 cubic yards of dirt and sand will be hauled via the belt from the borrow pits, and dumped over the left abutment. The belt is a 36-inch seven-ply rubber conveyor, and is strung down nine flights or sections of trestle. The belt passes through three tunnels, the largest is 980 feet in length, the second 475 feet, and the third 500 feet. All tunnels are seven feet high and eight feet wide. A huge amount of lumber and some steel was used in making the spans and transfers. Construction of the conveyor system began in April, 1942. As planned, several shovels and draglines will scoop up the borrow pit earth and loose it through surge hoppers which will spread the material evenly on the belt. The belt moves down the nine flights and shoots the fill over the rim into the bottom of the main excavation. Here, five D-8 Caterpillars with bulldozers and scrapers will transport the material to the opposite side and make the spread. Twenty-five ton sheepsfoot rollers towed by the

• Equipped with a 4½-yard dipper, a Bucyrus-Erie 100-B electric shovel loads out to a 20-yard Maxi truck during spillway excavation operations.

D-8 Caterpillars will tamp the fill at six-inch intervals to achieve the rolled earth-fill effect.

The conveyor system can carry 1,280 tons per hour down the side of cliff and over the rim, or 1,000 cubic yards every 60 minutes. Moisture will be added to the fill by sprays of water (pumped up from the river) at transfer station wetting towers equipped with a series of sprays.

When construction of the spillway and powerhouse site began, three electric and one diesel-powered shovel and dragline combinations went into action. They included one Bucyrus-Erie 20-B with a ¾-yard bucket, one Speeder of ¾-yard capacity, and two Northwest 80's, of 2-yard capacity.

The spillway and powerhouse excavation calls for the moving of 1,200,000 cubic yards of material from the left abutment, some of which will be left for the downstream portion. Most of it will be hauled to the waste and stockpile areas upstream and to the coffer dam. This work is now being done by several of the 10-yard Euclids and 25-yard Maxi trucks, until completion of the main excavation when the entire fleet of 32 trucks will be used at the spillway and powerhouse excavation. The Bucyrus-Monighan 6-W dragline, and several of the Bucyrus-Erie shovels will devote their attention to this work as soon as the main excavation is completed.

The second conveyor system from the other pits will operate on a principle similar to that at the first area. However, since its job will be mainly to furnish small boulders and rock for the downstream zone of the fill (approximately 2,500,000 cubic yards) the belt conveyor will pass through a screening plant that will remove all material over five inches. Oversize will go to the downstream section, and the gravel and small rock remaining will be transported to the upstream zone. A two-mouthed conveyor system, one transporting material upstream and the other downstream, may be utilized if present plans materialize.

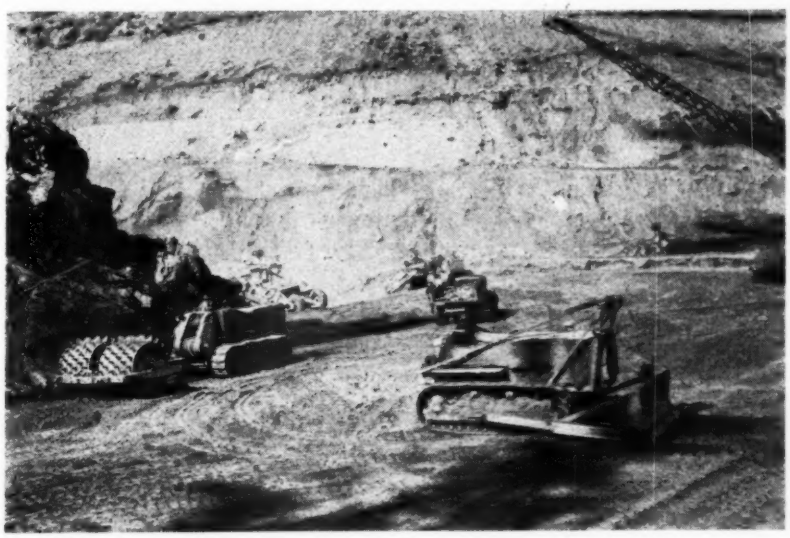
In addition to the borrow pits named, others containing additional material that may be needed are located near the pits upstream from the dam and atop the rim.

Will Use 66,000 Yards Concrete

For the total job, about 66,000 cubic yards of concrete will be necessary. This includes 8,000 in the tunnel, 4,500 in the cut-off walls, 8,000 in the inlet structure, 30,000 for the spillway and approximately 16,000 cubic yards for the power house. There is a central mixing plant for the concrete, located downstream from the dam. Two 2-yard mixers provide the concrete, cement mixed with sand and gravel produced from pits three miles upstream and hauled to the plant by trucks, and four trucks with 3-yard agitators transport it to the zone of operations. Tires for all trucks and other equipment are now obtained through rationing channels, and recapped tires are used extensively.

Power for the operation of electric excavators, blasting, and other construction phases, as well as for the dam's construction city, is supplied by the state's power company. The company strung a new wire more than 30 miles from a small community south of the site and transmits 66,000 volts to the substation at the dam. Here it

(Continued on page 572)



• A sheepsfoot roller and 'dozer are used to compact the fill in a section of the permanent upstream cofferdam which will eventually be embodied in the finished section of the dam.

Shots from the FIRING LINE

Brigadier General Luke H. Callan

A colorful and constructive career was brought to a close by the unexpected death of Brigadier General Luke H. Callan in New York City on September 9. General Callan died suddenly at the age of 67 in Doctor's Hospital at New York where he had gone for a physical check-up.

Widely known and respected throughout the East, General Callan was the founder and head of the Callan Construction Company of Bristol, Rhode Island. Under his leadership, this company performed much of the pioneer highway construction work throughout the New England states. Some of the first hard-surfaced roads in Florida were also constructed by the Callan Construction Company.

Born in 1875 in Bristol, General Callan received his early education in the public schools of that town. Later, he graduated from Bryant and Stratton Business College and began his first employment with the United States Rubber Company. This experience was followed by three and a half years of service for the Bristol Electric Company where he acquired the experience in engineering which led him to go into business for himself. This was the start of the present Callan Construction Company which has earned an excellent reputation in the highway construction field.

Early in life General Callan became interested in military affairs and at the age of 17 enlisted in the Rhode Island National Guard as a private. He rose rapidly to the rank of lieutenant colonel,

—"New England Construction" Photo

which he held upon voluntary retirement from the National Guard, in 1905. During the Spanish-American war he was infantry drill instructor at the militia camp at Quonset Point.

When the United States entered World War I, he volunteered for service and was commissioned lieutenant colonel of engineers and sailed shortly for France. Here, General Callan made a brilliant record. He first served as divisional engineer and then commanded the 107th Engineers, a regiment which was engaged in most of the major battles from March, 1918, until the armistice. After the armistice, he was in charge of the military policing of the buffer state of Luxemburg. At this time, he was promoted to the rank of colonel.

General Callan's distinguished services brought him awards of the Croix de Guerre with Gold Star, Order of the Purple Heart, Order of the Silver Star and the Distinguished Service Medal. One of his most cherished possessions was a letter from General Pershing, dated June 7, 1919, which commended him for "the able manner in which you handled the 107th Engineers during all the campaign of the 32nd Division."

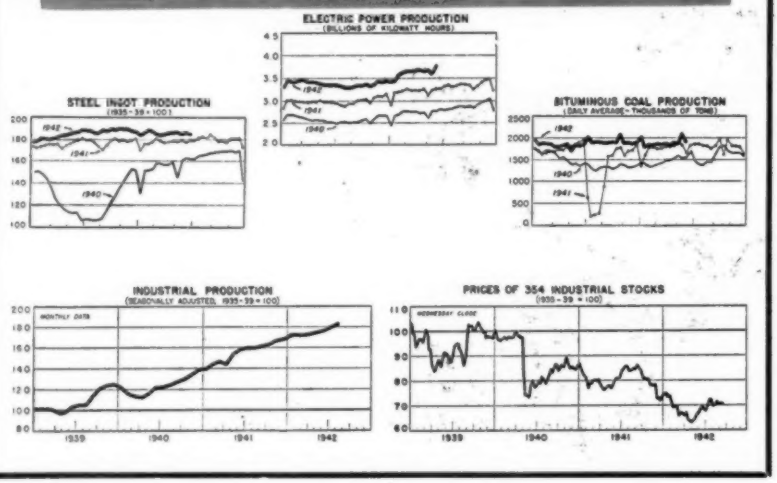
Returning from the war, General Callan resumed his contracting business and in 1922 was commissioned brigadier general of engineers in the reserve corps. He was active in founding the American Legion and was first commander of the Legion Post in Bristol.

General Callan was also prominent and active in local political affairs, serving as president of Bristol's town council, chief of police, highway commissioner, and state senator. He was also elected Republican candidate for governor of Connecticut in 1934, losing to the Democratic candidate.

General Callan is survived by his wife, Anna M.; a daughter, Miss Rita Callan; and a son, Luke H. Callan, Jr.

Interment was in Bristol with full military honors and hundreds of friends, state and town officials, civic leaders, and business associates were in the funeral cortege that bid a last farewell to a man loved and respected by all who knew him.

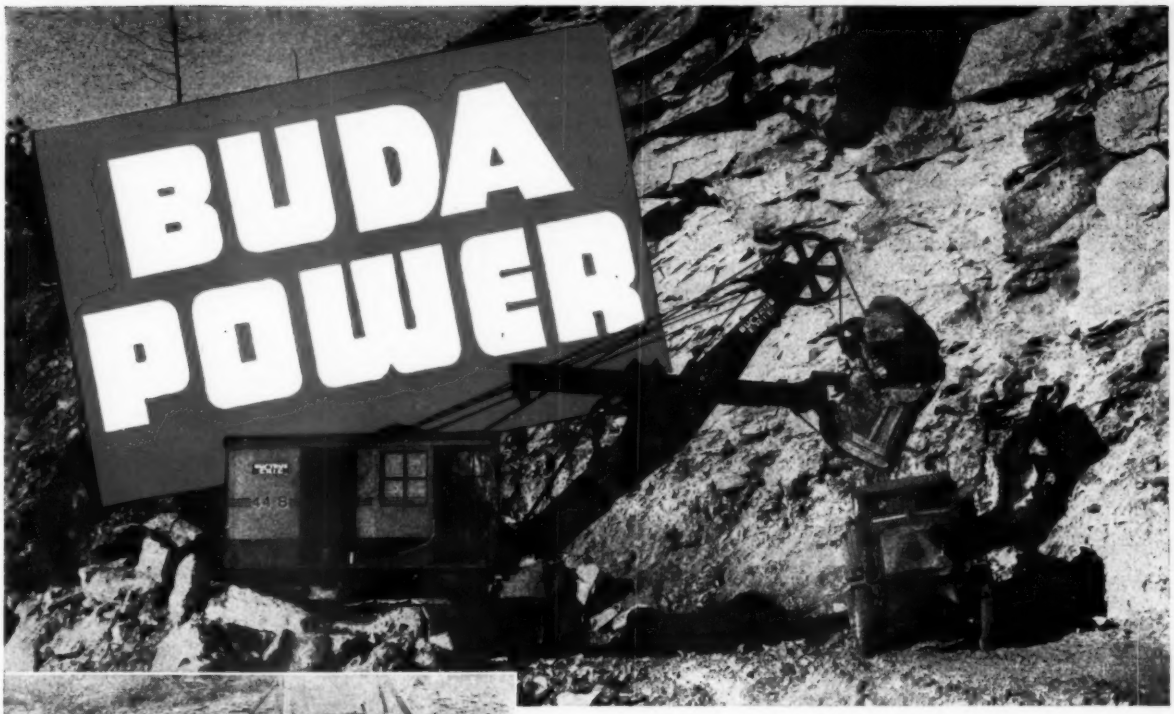
BUSINESS INDICATORS

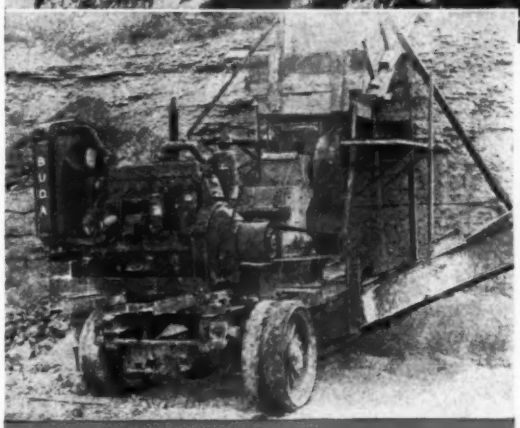


U. S.-Panama Canal Highway Nears Final Completion Date

The United States and the Panama Canal will soon be linked by an overland route, according to a recent state department announcement. Arrangements have been made with Guatemala, El Salvador, Nicaragua, Costa Rica and Panama to begin immediately construction work on the final links of the highway from the Mexican border to the Canal Zone. This new roadway will join with existing Mexican railways to provide a co-ordinated truck and railroad transportation service.

Approved plans call for construction of approximately 625 miles of new all-weather road to link up with about 925 miles of surfaced road which has already been built south from Guatemala to the canal and connects with the East-West Trans-Isthmian Highway now under construction. Surveying operations are already under way and the entire construction cost will





Top: Quick response to sudden loads, rugged power for tough work like this makes the BUDA an ideal engine for this husky Bucyrus-Erie 44-B.

Above: A Model K-369 Buda powers this busy Austin-Western Washing Plant.

Below: Low-cost power for this Illinois crushing plant is supplied by an economical BUDA 6-DT-691 Diesel.

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be financed by the United States. Specifications for the new pioneer road links provide for a roadbed width averaging 10 to 16 feet with an eight-inch gravel surface. Average maximum grades of 10 per cent and an average maximum curvature of 30 meters will be allowed.

"Completion of this road will be of the utmost strategic importance to the Americas," pointed out American Road Builders' Association Engineer-Director Charles M. Upham, who has served several Latin American governments as consulting engineer. "Not only will the new system link continental United States with its vital defense link, the canal, by an overland route safe from Axis sea raiders, but it is expected to alleviate in some measure the wartime economic difficulties and problems the Central American republics are facing as a result of disruption of their foreign trade and the present acute shipping shortage."

A.G.C. Holds Board Meeting

The fall meeting of the governing and advisory boards of The Associated General Contractors of America was held October 19 and 20 at the Drake Hotel in Chicago, Illinois. The A.G.C. Secretaries Council also met on October 18.

Purpose of the meeting was to plan how general contractors can continue to execute war projects at top speed, and can do everything possible to help in the war effort. In announcing the meeting, President Kimball said:

"In spite of all the construction that has been completed on or ahead of schedule, the industry has a tremendous war job to do. It must complete war construction at top speed; it must shift, if necessary, to other types of war production; and it must be ready to help stabilize employment when the war is over.

"Every day shortages of materials, rationing and increasing government regulations make the war job harder. Yet, every day the necessity for doing everything possible to win the war becomes increasingly clear. The governing and advisory boards in this meeting must see that this industry overlooks nothing that will help do its jobs."

Subjects for discussion included: renegotiation of contracts; proposed OPA price regulation for construction and other OPA regulations affecting construction; the revenue act; policies and procedures affecting war-time construction; equipment situation; labor matters; transportation regulations; priorities and WPB regulations; public relations; future problems of the industry.

Plan Post-War Road Program

Brigadier General Philip B. Fleming, federal works administrator, has announced that the first actual engineering work on post-war public construction, a projected highway building program to cost nearly $500,000,000, is well under way.

The engineering work, extending from conception of the improvements through surveys and the preparation of detailed plans and specifications ready for the contractors' bids, is going forward as a joint federal-state undertaking. It is being financed from a special $10,000,000 fund which the U. S. Congress authorized in the Defense Highway Act of 1941 with the requirement that the states match funds for projects according to the usual federal-aid plan.

Thomas H. MacDonald, public roads commissioner of the Federal Works Agency, reported to General Fleming the approval of projects, including the drafting of engineering plans, in the seven states of California, Massachusetts, Mississippi, Missouri, New Jersey, New York, and Oregon, and in the District of Columbia. Additional projects are under consideration by the Public Roads Administration, Commissioner MacDonald added. Actual construction will begin after the war.

General Fleming made it clear that this program is only part of the federal-aid highway construction and improvement program to be undertaken after the war. He pointed out that the projects on which the PRA and state highway department engineers are now working are aimed at the solution of major traffic problems on

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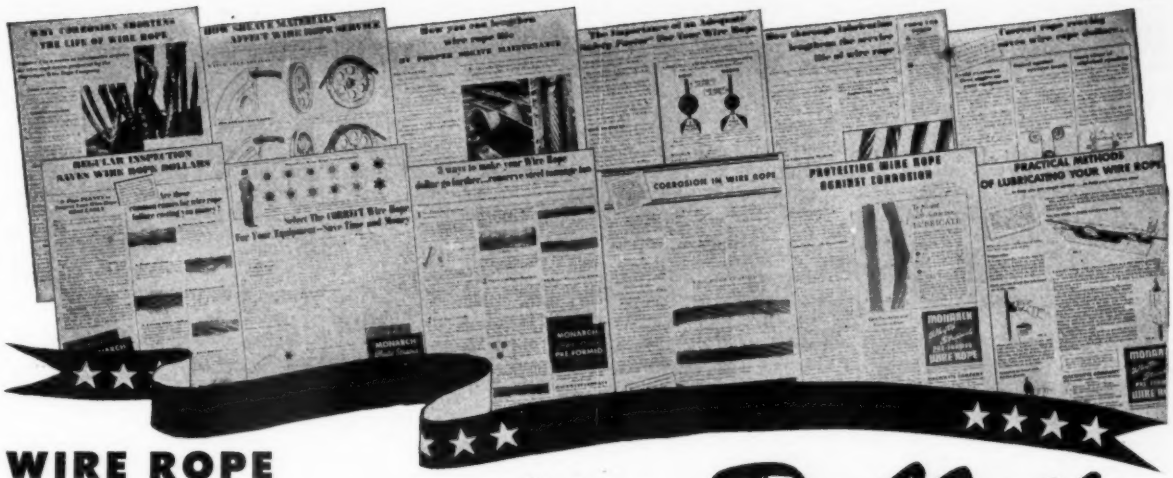

WIRE ROPE *Conservation Bulletins*

SENT ON REQUEST

We pause in this series of informative articles for wire rope users to review briefly the 12 thus far published . . . and provide an opportunity for those who may not have seen them to obtain reprints.

The purpose of this series of single-page illustrated articles on wire rope conservation is to help you conserve your wire ropes. This helps you, and helps our country for it means conservation of steel. We shall be glad to send you any or all of the articles listed below which readers tell us are useful and helpful.

1 ***Why Corrosion Shortens the Life of Wire Rope.*** Tells cause, effect, and suggests remedy for corrosion. Also explains how proper lubrication helps wire rope stand up against elements.

2 ***How Sheave Materials Affect Wire Rope Service.*** Pictures effect of hard and soft sheaves on wire rope. Explains what to watch for, how to avoid rope and sheave damage.

3 ***How You Can Lengthen Wire Rope Life by Proper Sheave Maintenance.*** Includes handy reference table on groove tolerances. Also points out 3 ways to save wire rope dollars.

4 ***The Importance of an Adequate Safety Factor.*** What is it? How Found? When is wire rope overloaded? What are minimum safety factors for various loads? All are answered in this easy-to-read, informative article.

5 ***How Thorough Lubrication Lengthens Service Life of Wire Rope.*** Explains two lubricating methods. Shows effect (Pictures) of ropes left unprotected.

6 ***Correct Rope Reeving Saves Wire Rope Dollars.*** Discusses fleet angles, reverse bends, rope spooling and what to do about them.

7 ***Regular Inspection Saves Wire Rope Dollars.*** Lists 6 common causes of wire rope failure. All can be avoided if rope user follows simple inspection procedure suggested.

8 ***Select the Correct Wire Rope for Your Equipment—Save Time and Money.*** Explains how Flexibility, Abrasion Resistance, and Strength are determined to meet varying conditions of Bending Fatigue, Abrasive Wear, and Loading Stress.

9 ***3 Ways to Make Your Wire Rope Dollar Go Farther—Conserve Steel Tonnage Too.*** Especially valuable to men actually handling wire rope.

10 ***Corrosion in Wire Rope.*** Gives further information on how to combat this rope destroyer. Supplements informative article number 1.

11 ***Protecting Wire Rope Against Corrosion.*** Shows some results of forgetting to inspect and protect wire rope with proper lubrication.

12 ***Practical Methods of Lubricating Your Wire Rope.*** Illustrates simple ways to lubricate your wire rope on the job. Very practical, useful for everyone concerned with wire rope care.

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- MACWHYTE Special Traction Elevator Cable
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Just circle those you wish and attach coupon to, or write on, your business letterhead.

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I would like reprints of informative articles on wire rope conservation which you have published recently. I have circled those I wish.

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Title _____

Company _____

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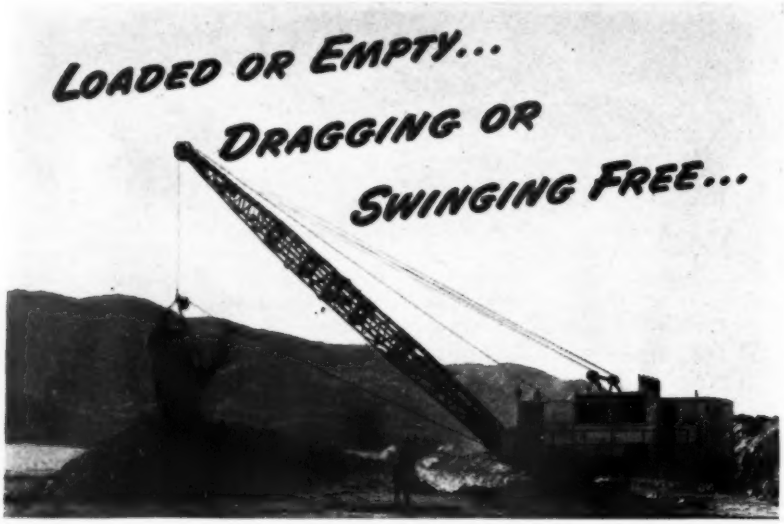
main routes through and around cities and on sections of highway that will form part of the proposed interregional highway system.

"Only projects of such magnitude as to require considerable time and study in planning are considered eligible for these funds," General Fleming said. "They are not available for projects that require only normal engineering work in advance of construction. These major road-building undertakings, together with normal extension of the primary and secondary federal-aid highway systems, plus the extensive repair work that will be necessary as a result of wartime curtailment of highway maintenance, will form an important part of the reserve shelf of necessary public works that the Federal Works Agency is accumulating to help take up the slack of post-war readjustment.

"At the present time," said General Fleming, "road-building, like all other construction activities of the Federal Works Agency, is of necessity confined to projects that are indispensable to successful prosecution of the war and lack of which would hamper the primary war program. With the coming of victory, however, an extensive public works program will perform a valuable function in providing useful employment to men demobilized from the armed forces and to many others who can be expected to be released while industry is converting from wartime to a peacetime production."



There's Always the Right Amount of Power with Pierce on the Job!

● Drag-line operation puts continuous demand on the governor unit because the load condition changes almost continuously. The governor must adjust the engine throttle automatically to meet these changes, keep engine speed constant, and provide exactly the right amount of power *every second!*

That's why Pierce Flyball Governors are so widely used on drag-lines and other gasoline, gas, or Diesel-powered equipment. Pierce Governors respond instantly to meet any change in load, making possible uninterrupted efficient operation of equipment. They hold engine speed constant, regulating within the closest limits, and provide unfailing protection for your equipment.

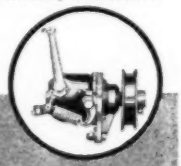
Because of their sturdy, precision construction, you can depend on Pierce Flyball Governors to stay on the job, year after year, and to perform faithfully . . . usually outlasting the engine itself!

* * *

Pierce production is now devoted entirely to war purposes; for this reason it is increasingly difficult to supply your new governor requirements except with the highest priorities. If you need new governors, or wish to have present ones serviced, see your Pierce distributor or get in touch with the factory for further information.

PIERCE GOVERNOR COMPANY • 1649 Ohio Avenue • ANDERSON, INDIANA

NOW... and after the war... insist on Pierce Flyball Governors when you purchase new Equipment!



Pierce Governors

STANDARD SINCE 1913

WPB Predicts Construction Drop of One-third for '43

The volume of all building and engineering construction, exclusive of shipbuilding, scheduled for the war program in 1943 will drop by more than a third, according to an announcement last month by the U. S. War Production Board.

At the present rate such war construction alone will reach a total of more than eleven billion dollars at the end of 1942, topping the previous all-time record for all types of construction established in 1927 with a figure slightly less than eleven billion dollars.

An estimate of next year's construction total was made in a telegram sent by Stacy May, director of the statistic division, WPB, to the annual meeting in Colorado Springs, Colorado, of the American Institute of Steel Construction. The text follows:

"It is expected that the volume of all building and engineering construction, exclusive of shipbuilding, sheduled for the war program in 1943 will drop by more than a third. Because of this reduction in the volume of construction and because of the use of methods which economize on steel, it is expected that the volume of fabricated structural steel which will be required for building and engineering construction, exclusive of shipbuilding, in 1943 will be substantially less than what has been used this year, and will amount to not over a million and a quarter tons. A larger proportion of this volume than heretofore will, moreover, probably comprise miscellaneous items of a special character rather than the normal structural steel for buildings.

"If the structural steel industry is to maintain a sizable volume, it would appear to be necessary for it to get contracts for fabricating items being produced directly for the war effort."

States to Pay Highway Debts from Savings on Construction

Savings effected through the curtailment of new highway construction for the duration of the war will enable many of the 41 states having highway bonds outstanding to accumulate funds to pay off their highway bonded indebtedness and thereby comply with the seventh point in President Roosevelt's inflation control program as enunciated in his Labor Day address to congress. The president declared that "we must discourage credit and installment buying, and encourage the paying off of debts, mortgages, and other obligations."

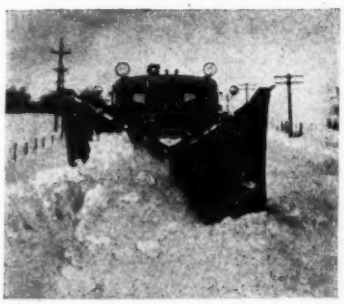
Figures compiled by the American Association of State Highway Officials show a total bonded indebtedness for roads and bridges under state control of $1,803,979,448 as of January 1, 1942.

14-Ton Welcoming Committee

From the Arctic to the Tropics, wherever our fighting forces disembark, they are generally greeted by the sight of a sturdy Baker Bulldozer that is busy making things ready for them.

Mounted on massive, powerful tractors, they are a welcome sight to Johnny Doughboy who saw Bakers doing the groundwork at camps and airports at home with speed and precision. But they're not a welcome sight to enemy bombers who know that our air bases won't stay bombed, with Bakers ready, willing and able to move right in after an attack to fill craters and remove debris. In fact, they've got those Jackaxis—Hitler, Hirohito and Mussolini—not a little worried. Thought they had us bottled up.

Well, they've got another guess coming. They'll find Bakers with their direct hydraulic blade lift and full down pressure can build camps and mold air bases—clearing brush and trees, leveling and grading — faster by far than forced hand labor can do it! Bakers are doing their part to win a rapid victory —send for a copy of "The Unsung Heroes of War."



Baker "V" type and One-Way Truck and Tractor Snow Plows will keep war production plants accessible this winter and army camps and airports free of snow.
Baker Road and Airport Building Equipment has enlisted for the duration, too.

THE BAKER MFG. CO.
542 Stanford Ave., Springfield, Illinois

BAKER

The Modern Tractor Equipment Line for
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

Normal maturity of these bonds range all the way from 1944 in Connecticut to 1979 in Delaware.

Highway construction by the states in normal times of peace amount to about $500,000,000 a year, but since the United States became a participant in the war, all highway construction has been halted except for roads of strategic military importance.

Offset against the savings in highway construction is the reduction in highway revenue resulting from rationing, the curtailment on new automobile production, and other wartime restrictions in motor travel. In some states the savings effected from the stoppage of new construction will exceed the decline in highway revenue, making it possible to pay off callable bonds or to set aside funds to meet bond service in the future.

Prior to the war, highway bond service was taking a substantial slice out of gasoline tax revenues in many of the states. In Arkansas highway bond service absorbed 73 per cent of the state's share of the gasoline tax. In Florida it absorbed more than 40 per cent, in Iowa 44 per cent, in Louisiana 65.8 per cent, in Mississippi 51.6 per cent, in Missouri nearly 38 per cent, in New Mexico 41 per cent, in Tennessee over 43 per cent, in West Virginia 44 per cent, and in other states substantial proportions.

With state gasoline tax revenues curtailed by the war, bond service will require an even larger proportion of gasoline tax receipts. The use of all savings effected through the stoppage of new construction, as well as other surplus highway funds, to pay off outstanding highway bonds, however, is being used by eight states to strengthen the financial status of their bonds. These states include: Iowa, Maine, Minnesota, Missouri, Montana, New Mexico, Oregon, Tennessee, and West Virginia.

Safety Congress Convenes

How much are accidents actually hurting war production?

How can these accidents be stopped?

The answers to those questions, and hundreds of others, were sought by 10,000 delegates and vistors to the 31st National Safety Congress and Exposition held in Chicago, October 27-29.

The congress was sponsored by the National Safety Council and served as a mobilization for the safety forces of the nation which, under the leadership of the council, are conducting a nationwide emergency safety campaign at the direct request of President Roosevelt.

The theme of the Congress was, "Save Manpower for Warpower." All the 175 sessions, with 500 program participants, were devoted to the problem of how organized safety can best help the war effort by reducing accidents that are wasting manpower, material and time vital to victory.

The "Save Manpower for Warpower" theme predominated the congress from start to finish. It was the basis of a speech by Rear Admiral William H. P. Blandy, chief of the ordnance bureau of the United States Navy at the congress banquet.

Streamlined this year into a three-day period because of the war, the Congress program was regarded as the most important in the 30 years of the council's existence. Every topic on the program was chosen because it had a definite part in helping win the war.

"The president of the United States has asked safety to do a job as specific in the war program as the production of munitions," said Ned H. Dearborn, executive vice-president of the council. "Our job is to stop accidents that are hindering the war effort, and to this job the entire congress is dedicated."

New Jersey Traffic Increases

That highway maintenance problems of some states may increase rather than decline, irrespective of curtailed passenger car travel under rationing of vehicles, gasoline and tires, is indicated by New Jersey's experience.

A "startling" increase in truck and bus traffic on New Jersey highways although passenger car traffic dropped sharply since the advent of gasoline

10 REASONS WHY-

Men Like to Handle UNION-FORMED Wire Rope

1 **Union-Formed** (pre-formed) ropes resist unraveling and unlaying when cut.

2 They are more easily spliced because strands fit perfectly in place.

3 They are installed more easily and quickly.

4 They spool evenly and tightly, due to their freedom from crankiness.

5 **Union-Formed** wire ropes resist kinking, as the structure is inert.

6 They resist drum-crushing better, because of even spooling and firm body.

7 They end "porcupining." The wires when worn lay flat to the rope.

8 They socket better, as wires can be mule-tailed in an orderly fashion.

9 The strands and wires stay in fabricated balance; do not develop high strands or drawn wires.

10 They resist whipping associated with vibration.

WRITE FOR ROPE DOPE

Contains interesting current data on wire rope. Mailed without charge.

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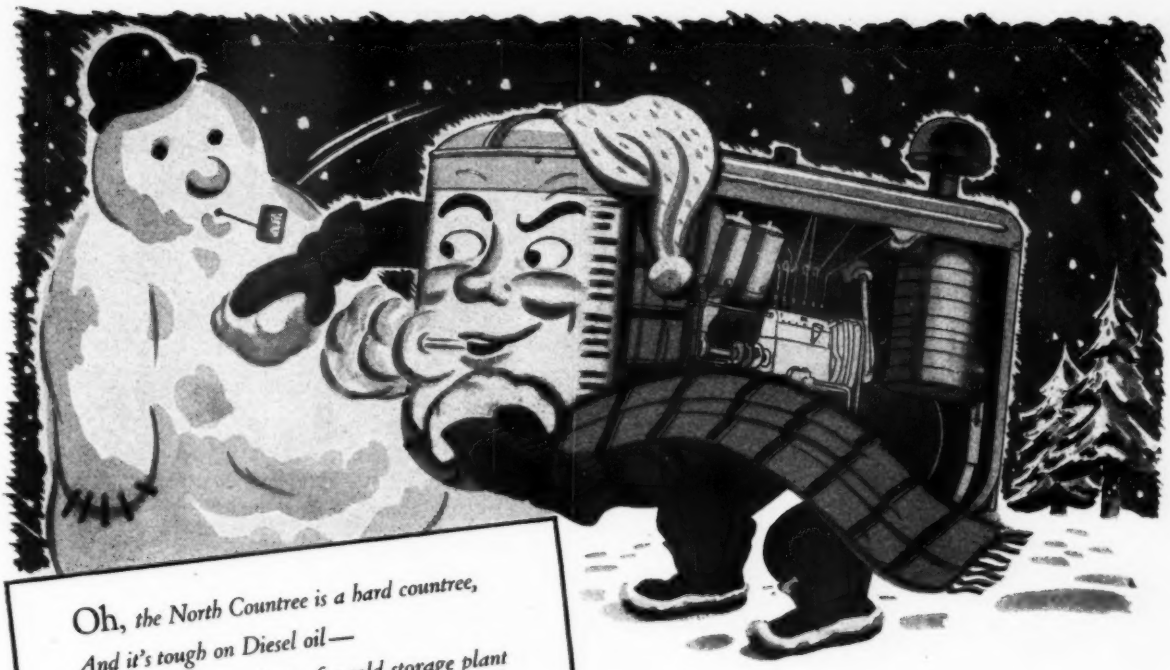
The "ULTIMATE LOW COST WIRE ROPE"

1-42



Oh, *the North Countree is a hard countree,*
And it's tough on Diesel oil—
But hark while we chant of a cold storage plant
(Where you keep things, lest they spoil).

Back in April, 'Forty—yes, 1940—
A big six-cylinder Dies'
Went to work with a will, creating a chill—
Its motto: "I aim to freeze."

Oh, *the North Countree is a hard countree,*
And a year is twelve months long;
Yet, it's perfectly true that in March, '42,
This Diesel still ran like a song!

Oh, *oil-buyers wary, oh oil-buyers chary,*
You can see that the moral is clear:
Your Diesel runs swell-o on RPM DELO
And does so for many a year!

EVER since the Marshfield Cold Storage Company of Marshfield, Wisconsin, installed its International UD-18 6-cylinder, 108-H.P. Diesel in April, 1940, the engine has been lubricated exclusively with RPM DELO. It has had 10,000 hours of continuous operation—and here are the results:

When the engine was thoroughly overhauled last March, cylinders showed less than .0035 inch maximum wear, pins were all tight and showed less than .002 inch wear, rod bearings were in "exceptionally fine condition." No wonder the company says, "we are indeed happy we selected RPM DELO as our lubricant and would not hesitate to highly recommend it."

STANDARD OIL COMPANY OF CALIFORNIA

RPM DELO
DIESEL ENGINE LUBRICATING OIL

RPM DELO is marketed under the following names:
RPM DELO · Caltex RPM DELO · Kyso RPM DELO
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CONCENTRATE
Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity

FOR BIGGER PAY-LOAD DIGGING

HAISS
HI-POWER

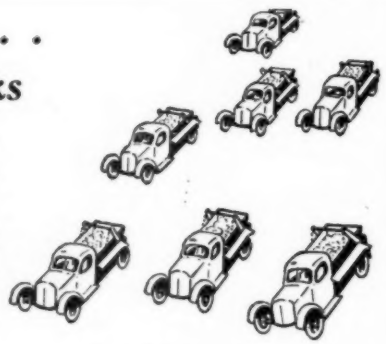
CAST STEEL BLADE ARMS HOLD CLOSING ALIGNMENT...

Rigid strength and extra long bearings keep bowl closing true. Full efficiency. Bigger pay loads...They don't come any better.

Buckets in stock at New York, Philadelphia, Baltimore, Atlanta, Richmond, Charlotte and Los Angeles... *Write or wire for prices, delivery and catalog details.*

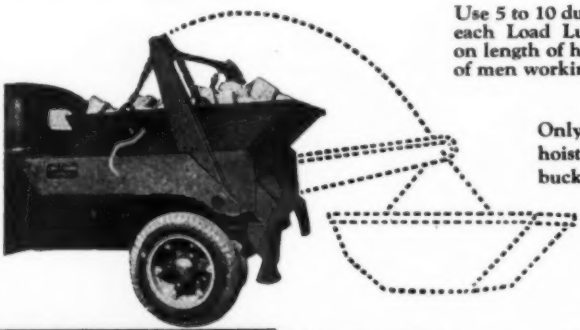
GEORGE HAISS MFG. CO., INC., 144th ST. & PARK AVE., NEW YORK

More Payloads . . . with Fewer Trucks



. . . when you mount a Load Lugger on the chassis. No idle trucks waiting to be loaded. The detachable buckets are picked up and dumped while the empties are being filled. Low bucket height means easy loading and more effiicient hand labor. Use the Brooks System for excavating, road building, quarry operations, construction or general hauling jobs.

Use 5 to 10 dump buckets with each Load Lugger depending on length of haul and number of men working.



Only 15 seconds for hoisting or dumping buckets.

One-piece leak-proof buckets, welded and reinforced.

311 Davenport Road Knoxville, Tennessee
Distributors in all Principal Cities

Brooks EQUIPMENT AND MFG. CO.

rationing, was shown by traffic checks by the State Highway and State Police departments as announced last month in Trenton.

Truck traffic at one point was 67.90 per cent ahead of the same period a year ago, it was stated by State Highway Commissioner Miller. At other points where counts were taken the increases, respectively, were 26.16, 22.52 and 21.99 per cent.

A check on bus traffic in one section indicated that 96,205 buses are using New Jersey highways this year, compared with 89,403 last year.

Asserting that growing demands upon the highway system are bringing more rather than fewer maintenance problems, Commissioner Miller added:

"Estimates of the bus traffic indicate they will have a monthly passenger load of 82,000,000 by December, an increase of 60 per cent in a single year.

"The State Police Traffic and Safety Bureau, under direction of Lt. A. M. Sperling, between Jan. 1 and Sept. 1 of this year, had men assigned to escort military convoys in addition to other work involving war traffic control. In this duty the police covered a total of 106,196 miles, representing 3,480 man days."

Propose Palisades Bomb Shelter

By Bethune Jones

Conversion of the New Jersey Palisades into a gigantic hollowed repository for war factories, valuable documents and art treasures has been suggested by George J. Atwell, president of the George J. Atwell Foundation Corp., New York, who pointed out that in such a vault there would be eternal safety from the most destructive enemy bombings.

Atwell's idea, as made public in September at the National Democratic Club, New York, of which he is a former president, calls for the digging of a tunnel 200 feet wide and 100 feet high through solid stone for a mile and a half to the Weehawken Meadows, where the Palisades ends.

Declaring his plan could be carried out without the diversion of essential war materials, Atwell explained: "We would merely need drill steel, dynamite and men. We have sufficient idle machinery already available, as well as dynamite, and there are still 400,000 unemployed men in New York alone. Through the use of these three essentials the tunnel could be completed within a year."

Head of an impressive list of excavating and construction firms, including Thompson-Starrett Co., Atwell has long been a leader in the excavating field. Among the many New York projects for which he has done the ground construction work are all of the Radio City buildings, the New York Life Insurance Building, the Federal Court

POSITIVE CONTROL FOR ACCURATE BUCKET SPOTTING

Koehring Independent Boom Control

saves seconds on material handling work. Independent boom control permits accurate spotting of concrete buckets for high speed concrete placing on building construction projects. Raising or lowering the boom while swinging or traveling is a second-saving feature. Koehring Cranes are high speed, easy handling, have accurate and positive control. The many time-saving advantages of Koehring means speed on the job, more work per shift, less man power . . . waste motion is reduced to a minimum, every move is a production move.

KOEHRING COMPANY
MILWAUKEE · WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

House, and numerous others. In 1939 he organized the Sidewalk Superintendents Club for pedestrian kibitzers at Radio City.

Although the plan for the Palisades project is the most ambitious of his career, Atwell is convinced of its efficacy and utility.

"You can't make a bomb-proof building, but you can make a bomb-proof shelter by putting it far enough underground," he stated. "The tunnel would be dome-shaped and self-supporting. It wouldn't be necessary to have steel supports, and it could be waterproofed and air conditioned—all cheaper than building on the surface."

Placing the cost at 25 cents a cubic foot as compared with a cost of one dollar a cubic foot above ground, he said the tunnel could be built for $37,500,000.

Atwell revealed his plan after just completing a bomb shelter for the Frick Museum at 1 East 70th St., New York. That shelter, 25 by 100 feet and 50 feet beneath solid rock, cost $300,000, he said.

"If a shelter this small will hold the entire Frick collection," he commented, "one such as I propose for the Palisades could house practically all of the important public documents and art treasures of the nation."

As to how such a project might be financed, Atwell said the federal government, the city of New York or any of the political subdivisions interested in the protection of its documents could bear the costs.

"You could also place entire factories inside," he continued. "You could build airplanes or manufacture other war materials there."

Atwell attributed the origination of the idea partly to John C. Evans, chief engineer of the Port of New York Authority.

Highway Research Meeting

From Washington, D. C., comes announcement of the twenty-second annual meeting of the Highway Research Board, to be held this year from December 2 through 4 at the Hotel Statler, St. Louis, Missouri.

According to R. W. Crum, director of the board, it is expected that time and travel facilities will be greatly conserved by holding this meeting contiguous to that of the American Association of State Highway Officials which occurs in St. Louis the week following.

Construction Maintains High Level

Total valuation of construction contracts awarded during the month of September in the 37 eastern states was $723,216,000, according to F. W. Dodge Corporation. This is $2,188,000 above the previous month and $99,924,000 or 16 percent ahead of September 1941. For the first three-quarters of 1942 the total valuation of contracts is 35 percent greater than for the corresponding period of last year.

Contracts for non-residential building during the nine months' period amounted to $2,989,130,000 of which $1,809,834,000 or 60 percent was in the industrial building classification. The valuation of industrial building contracts to date this year considerably exceeds the 1941 nine-month valuation of $1,682,166,000 for all types of non-residential building combined.

Residential building contracts awarded in the first nine months of this year

Sauerman LONG RANGE MACHINES

A simple SAUERMAN Scraper machine stores and reclaims a seasonal surplus of 30,000 tons of screenings at crushing plant.

Here's another small SAUERMAN Scraper that moves sand from hill to asphalt plant at cost of 4 cents per cubic yard.

This shows a typical SAUERMAN Scraper layout for storing and reclaiming large tonnage of coal, or any bulk material.

Dig, Haul, Dump
in one operation!

On jobs where materials are to be moved distances of several hundred feet or more, a SAUERMAN Drag Scraper or Cableway is a great money-saver because it will dig, haul and place the materials without the help of other equipment.

First cost of a SAUERMAN machine is reasonable, maintenance expense is moderate, and the simplicity of operation permits easy one-man control of even the largest installation.

Moreover this equipment is very flexible and is readily adapted to meet any new and difficult working conditions. Sizes range from small portable units designed for cheap handling of a small hourly tonnage of loose materials up to powerful machines that will move as much as 1,000 tons per hour of the toughest materials.

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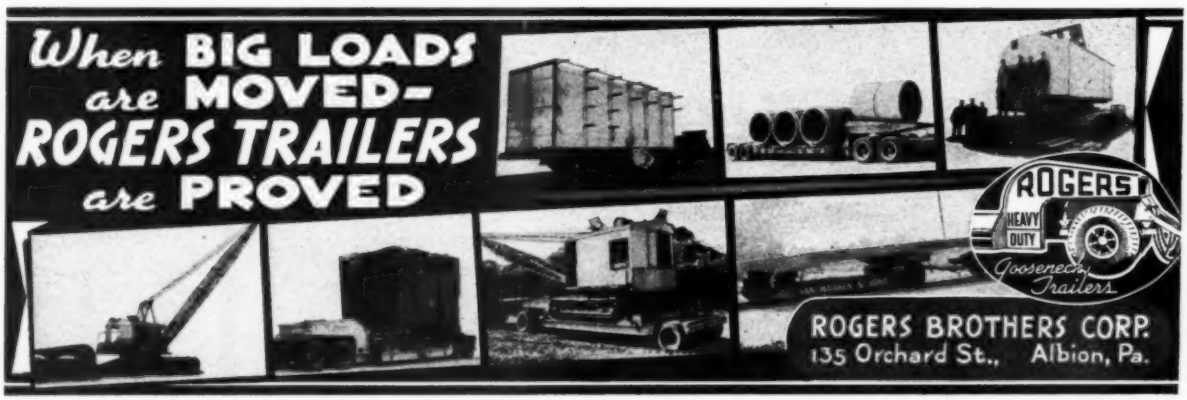
SAUERMAN BROS., Inc.
574 S. CLINTON ST., CHICAGO, U. S. A.



fell 14 percent short of the valuation attained during the corresponding period of 1941, while heavy engineering projects exceeded last year's dollar volume by 41 percent.

PRA Approves Virginia Highway

Virginia Highway Commissioner J. A. Anderson announced September 25 in Richmond that the Public Roads Administration had approved plans for the construction of the $7,500,000 Henry G. Shirley Memorial Highway from Occoquan Creek, Virginia, to the Arlington Bridge in Washington.

To be financed with $6,500,000 federal funds and $1,000,000 state funds, the highway is to be four lanes with the north and southbound lanes divided. It will be 17 miles long, cutting off four miles of the present distance from Occoquan Creek into Washington on Route 1. General Anderson said bids for construction of the highway would be asked at an early date.

The new highway, which is named for the former Virginia highway commissioner, who died last year, will parallel Route 1 on the west, branching from the present road at the north bank of the Occoquan Creek. The highway will run west of Alexandria, connect with the U. S. War Department network in Arlington, and end at the south bank of the Potomac River at the Arlington Bridge.

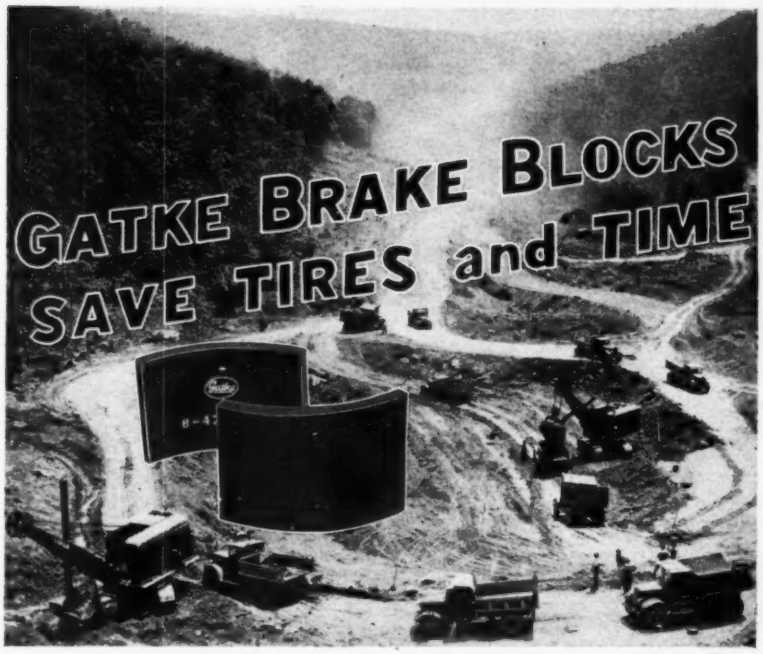
Approximately two years will be required for the construction of the road, which will include 22 bridges over its 17-mile course.

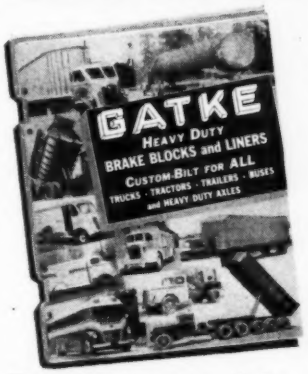
A census-taker knocked at the door of a home and was ushered in by a colored woman whom he found to be "Mrs. Johnson" and the mother of a roomful of pickaninnies reminding one of the stairsteps.

Upon questioning Mrs. Johnson, the census-taker learned that she had been a widow for ten years. And when she gave the age of her youngest child as two, he suddenly interrogated.

"But didn't you say your husband passed away ten years ago?"

"That's right, suh; he's dead, but Ah ain't!"





Write for your copy of the new GATKE Heavy Duty Brake Lining Catalog.

For Trucks, Tractors, Trailers and Heavy Duty Equipment of *all* kinds, GATKE CUSTOM-BILT Brake Blocks offer countless advantages—

Correct holding power with smooth, non-grabbing action that *saves* tires

Safe, dependable stopping power under all conditions

Extra wear life that keeps equipment rolling with fewer adjustments and less time out for maintenance.

Make this simple test. Use GATKE CUSTOM-BILT Brake Blocks on your next five relines and compare results with the best you have ever had.

Ask your GATKE Jobber or write us for particulars.

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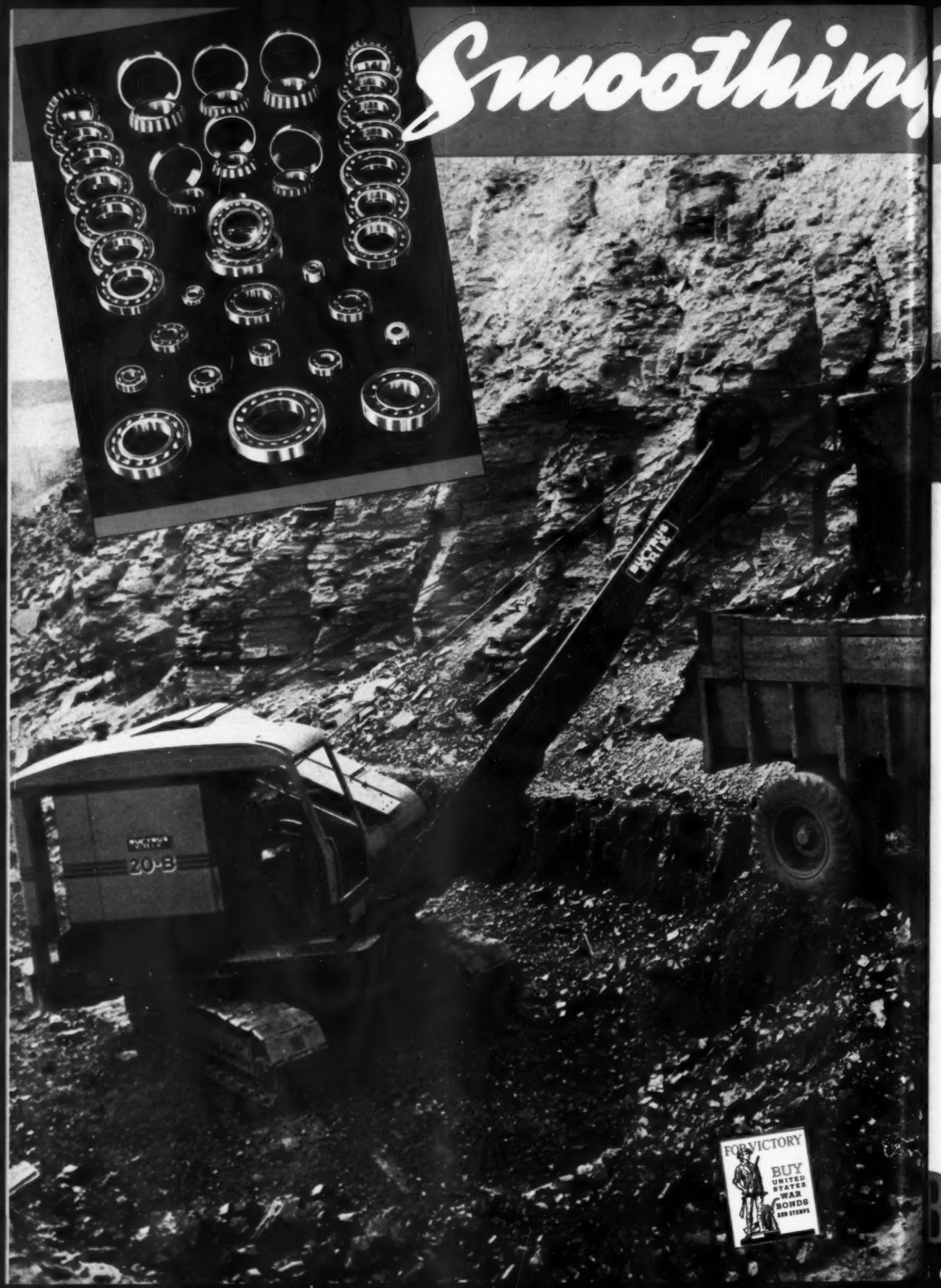
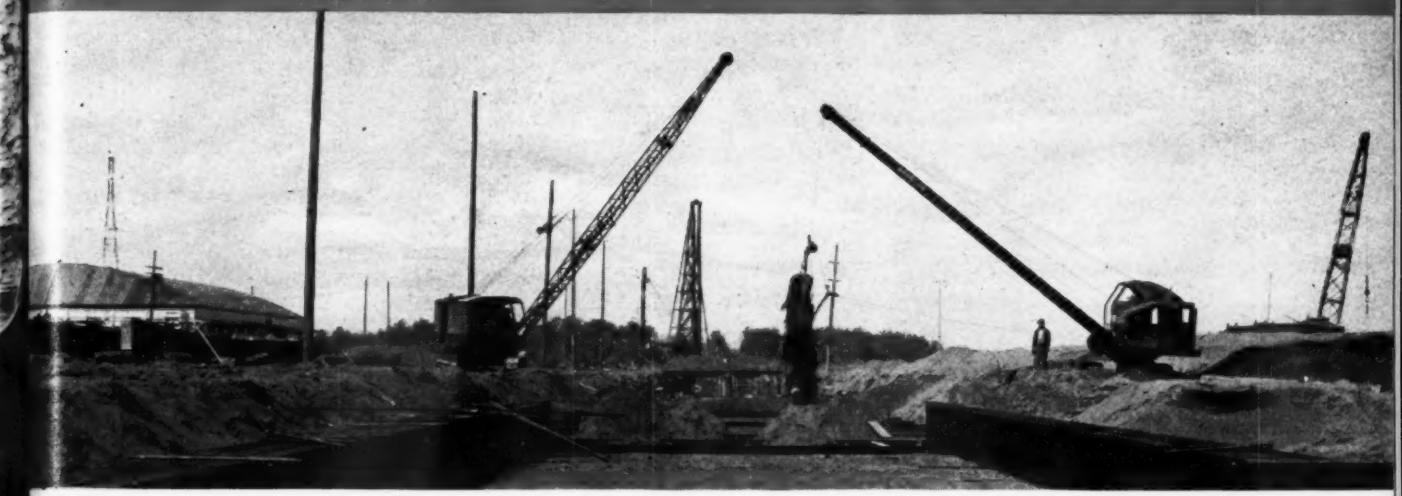
THE
OWEN BUCKET COMPANY
6095 BREAKWATER AVE. CLEVELAND, OHIO
BRANCHES: New York, Chicago, Philadelphia, Berkeley, Cal.


Smoothing
20-B
FOR VICTORY
BUY
UNITED
STATES
WAR
BONDS
AND STAMPS

the way to Output



In ⅜-yard, ½-yard, and ¾-yard, Bucyrus-Eries, every power-transmitting part on the revolving frame used in the digging cycle is mounted on anti-friction bearings. This means that not just the drum shafts, but the parts on those shafts as well, run on anti-frictions. That's one of the reasons why maximum power actually gets to the point of action in Bucyrus-Eries, why maintenance requirements are low, why efficient machine life is long, why these machines deliver the sustained output so necessary for war work today.

CHECK THESE OUTPUT-PRODUCING *Bucyrus-Erie* FEATURES:

1. Anti-friction bearings;
2. Oil-enclosed gears;
3. Direct-action, "weather-proof" clutches, with interchangeable main parts;
4. Ample power especially adapted to excavator service;
5. Full mobility with complete steering control;
6. High efficiency with any type front end.

Two out of every three Bucyrus-Eries sold are repeat orders . . . the best evidence that, with Bucyrus-Eries it's performance that talks.

Bucyrus-Erie Company

SOUTH MILWAUKEE · WISCONSIN · U S A

• Superintendent Jim Kennedy inspects the rolls on a crusher at Basalt Rock Company's Healdsburg plant.

Moving Gravel . . .

(Continued from page 553)

that housing the first 4x10 screen, the two surge bins and the crushing units. From this point on, all screening units are located at points along trestles running over the stockpiles. In this way, it is possible to chute part of the product of each screen directly to stockpile, using the economical "drop delivery" principle to its maximum. The stockpile areas are arranged in a "T" shape, with the stem of the "T" forming the sand and crushed rock areas, and the cross-bar, the natural river gravel storage points.

Conveyors operating in 6x8-foot concrete lined tunnels reclaim the stockpiled material. The sand and crushed rock belt, which is 400 feet long, discharges onto the 550-foot long belt running under the gravel stockpiles. The latter belt has two sections. The main belt, at the point where it emerges from the tunnel, transfers onto an inclined conveyor which leads to an elevated transfer station. From here, the gravel may either be sent on a 30-inch x 150-foot belt to a location over the railroad tracks for loading gondolas, or to the ten 60-ton concrete bunkers for truck loading. The railroad cars are spotted underneath the belt continuously. When one portion of the car is filled, the train is moved forward with a car puller.

All screens, with the one exception noted below, are Niagara. Link-Belt Company supplied the conveyors, and New York and American rubber belting is used for the greater part. The motors in the plant are Fairbanks-Morse and General Electric, while Pacific gear reducers are employed.

Shuttle Conveyor Employed

The various sizes of rock and gravel going to the truck loading bins are deposited from the belt onto a 24-inch x 30-foot shuttle belt which passes longitudinally over the bunkers. Each of the bunkers is provided with two discharge gates in the bottom. One empties onto a 24-inch belt, 60 feet long, going to the Standard Steel Company asphalt plant, while the other empties into the weigh hopper for concrete batches. This 5,000-pound hopper rides on rails under the bins, and is equipped with Fairbanks scales. It is moved manually.

A 4x10 Niagara single deck screen is installed at the transfer point for final washing of rock and gravel which is discharged into cars, while washing of material to the truck bins is washed with a 3x6 Symonds screen located at the shuttle belt. These are, of course, fitted with the proper size screens for the current size of rock being loaded.

Water for the operation comes from bored wells. The first one has an eight-inch Fairbanks centrifugal pump, and supplies water for the screens. The other, which handles the loading installations and the asphalt plant, is a three-inch pump of similar make and type.

Waste water is piped to three settling ponds, from which it is filtered through gravel dikes to the river. Russian River is the scene of numerous resorts at points downstream from the plant, and it is necessary to clarify the flow for this reason.

There is 700 horsepower of connected load in the operation, ranging from the 125-horsepower main generating motor on the dragline down to the fractional horsepower units on grinders in the shop. Sixty-six hundred volts are taken in at the plant and transformed down, with 440 volts used at the plant and 2200 on the dragline.

Day in and day out the big Bucyrus-Monighan swings 3½-yards of dripping gravel into the field hopper, and the huge Euclids rumble up the road to the plant. Screens shake, crushers vibrate and conveyors speed rock from operation to operation. Dusty dump trucks roll in and out. Trainloads of aggregate snort away as Basalt Rock Company does an important job for the war effort.

Rolled-Fill Dam

(Continued from page 557)

is stepped down to the voltage required for the various operations.

Compressed air for drilling, pumping and other work is furnished from a central compressor plant downstream from the dam in the main repair shop. Fuel oils, lubricants, and gasoline are delivered to the bulk plant below the dam, which has a 100,000 gallon capacity, and from there is sent out by smaller trucks as needed. The repair shop, completely outfitted, has lathes, drill presses, shapers, a machine shop, and is equipped for even major repair work. An auxiliary power plant has also been constructed, but has never had to be placed in service.

Work on the dam operates in three shifts, round the clock for 24 hours a day. Peak employment so far is 900 men. Married men and their families live in the small homes constructed downstream from the dam. The town has bunk houses, homes, and other living quarters complete with sewage and power, a commissary, pool hall, bowling alleys, theater, grocery store, and hospital with a full-time doctor and nurse.

• General upstream view of the contractor's camp and plant with the dam site in the background.

A safety program at the dam project is under the supervision of a safety engineer, who also publishes a bi-monthly leaflet. This publication includes descriptions of all accidents during the previous two weeks, safety suggestions and safety rules.

The safety program is characteristic of the policy adopted by the company on other construction jobs, and fatal accidents during the company's life-time have been few.

The company sponsoring the project holds many millions of dollars in war contracts, and is one of the largest private contracting concerns in the world.

Butler Brothers

(Continued from page 549)

truck operator in the course of eight hours, shifted gears as much as 400 times and, even though backing at the shovel was eliminated, backed his truck some 80 or 90 times at the transfer platform or on the dump.

Truck maintenance and constant field supervision is the company's most important safeguard against trouble. Each truck is serviced once every 24-hour period regardless of whether it has worked one, two, or three shifts. On the day shift, each operation is furnished with an extra truck and operator to substitute for the

EVEN SIDEWALK SUPERINTENDENTS KNOW A GOOD BUCKET WHEN THEY SEE IT

Of course they judge on how quickly it buries itself for a big pay load, how it swings without spilling, to dump smoothly and cleanly into the waiting truck. They don't know, as the contractor's superintendent does know, how long Williams Buckets last with little maintenance expense, and how well they deliver on the toughest hardpan jobs or handle rubble or concrete chunks.

THE WELLMAN ENGINEERING CO., 7002 Central Ave., Cleveland, Ohio

WELDED
ROLLED STEEL CONSTRUCTION
for GREATER STRENGTH and SPEED

If you want the engineering reasons why it will pay you to make your next bucket a Williams, send for descriptive bulletins.

Distribution in all parts of the country.

WILLIAMS *Buckets*
built by WELLMAN

trucks going in for servicing. As nearly as possible, the same operators are kept on the same trucks. When a truck leaves a job for servicing, the regular driver takes it in, assisting the service mechanic in the servicing. This system has worked out very well since the driver knows the eccentricities of his truck and is qualified to report on its operation or its operating failure. Furthermore, he is under obligation to report any and everything about his machine which might produce a failure while in operation. Servicing, of course, includes routine greasing, fueling, changing oil, checking tire pressure, water in the radiator, etc. In addition to this, the motor, gear housings, transmission housing and frame are inspected for cracks or breaks. Tires are inspected for bruises and cuts, and if a tire is found to be badly damaged, it is replaced since tire blow-outs are dangerous, both to the driver and to any workmen in the immediate vicinity. The damaged tire is then sent in to be vulcanized.

Electrical equipment is tested and when found faulty, an electrician is called. A truck with faulty brakes is taken out of service and not used until repaired and tested. This servicing is supplemented by a field foreman whose time is spent on the job. He is an expert whose knowledge and experience have combined to furnish the operation with an almost constant checkup of the performance of each truck.

Truck roads and their upkeep have also received careful study, since good roads are an absolute necessity to efficient truck haul. The company's hauling roads are planned 40 to 60 feet in width with generous curves and good visibility. While in service, these roads receive daily maintenance attentions from bulldozers, auto patrols, and water sprinklers. This combination creates a hard surface, free from chuck holes, porous rock or dust. By eliminating rough roads, the truck operator's job is made easier and the hazard of blow-outs is reduced. The practice of sprinkling the roads assures safe visibility and protects the drivers from uncomfortable dust inhalation.

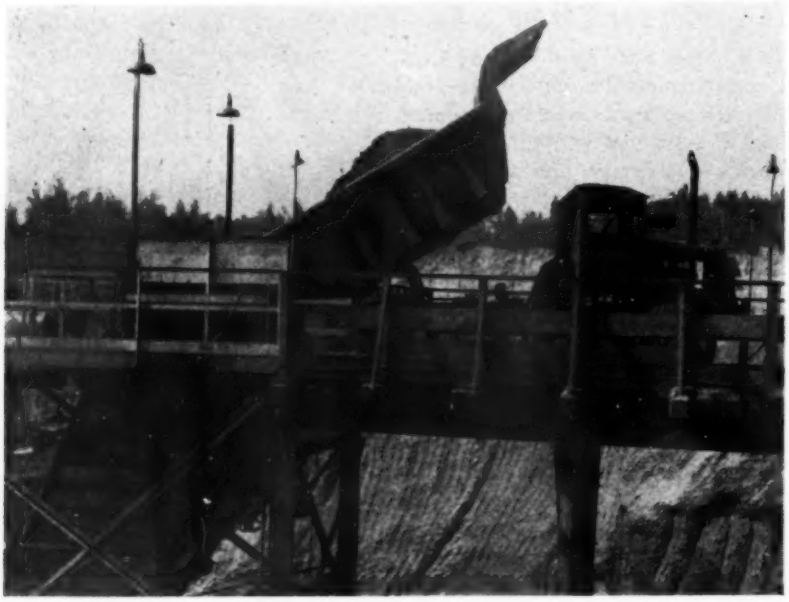
Although many of the above precautions may seem basic, careful application of them has made the substitution of trucks for rail haul on Butler Brothers operations a complete success from an efficiency as well as a safety standpoint.

Hand in hand with the development of truck haul came the installation of belt conveyors and pit screening plants. To avoid long hauls up steep grades to the hoppers of the washing plants located at each mine, Butler Brothers installed conveyor belts leading down into the pit. These belts are fed from screening plants that weed out oversize material. Thus, instead of a long, steep haul to the washing plant with a large amount of oversize material in their loads, the trucks make short, fast hauls to the screening plant hopper which screens out the oversize and sends the balance of the crude ore on its way to the washing plant via a "rubber railroad."

This method makes possible a more thorough cleaning out of the present pits since trucks and shovels can follow the ore into corners or at depths where locomotives due to lack of space or prohibitive grades, couldn't operate.

Thanks to these changes and improvements, the Butler Brothers organization under the executive guidance of Cooley Butler, chairman; Emmett Butler, president and general manager; and Patrick Butler, Hazen E. Butler, and Francis Butler, vice presidents is in a position to do its part in fulfilling Uncle Sam's present need for the material that is so vital in manufacturing the tools of war. Although the company's main offices are in St. Paul, general supervision of its stripping and mining operations on the Mesabi comes from the company office at Cooley, Minnesota. Here, R. W. Whitney, general superintendent, directs the activities of some 685 men engaged in a task of moving 8,000,000 tons of crude ore before the season closes. Superintendent Whitney has been with the Butler Brothers organization for 22 years and has played an important part in the development of the company's open cut mining procedure.

At the time of the writer's visit the company was currently operating four mines, namely, the Barbara, Galbraith, Kevin, and Harrison. To get some idea of how Butler Brothers modern policies of equipment and methods are working out, let's visit these strip-



• Fifteen tons of iron ore hit the hopper chute as a Euclid deposits its cargo at the Barbara mine's conveyor screen.

BOB MARTIN, STEEL SALESMAN, IS NOW A *Scrap Expediter!*

American steel producers and steel warehouses are mobilizing their sales personnel to help you do a 100% job of getting in the scrap

WE'VE called him Bob Martin for short. He may be a U·S·S salesman, or he may represent some other steel supplier. In any case, it's his job to help you get the steel you need for war production when you need it. Things being what they are, that's a tough assignment in itself.

But now Bob Martin and many of his fellow salesmen have another war job. They've been made scrap expediters, too! The grave need for more scrap to produce more steel calls for unprecedented action. That's why the Steel Industry has joined forces with the War Production Board to make a thorough, continuous canvass of scrap resources in the plants of steel consumers.

So don't be surprised if the next steel salesman who calls at your plant asks first how he can assist your scrap drive. His experience equips him to help you do the best possible salvage job. And he has been given special information by the WPB to make his efforts tie in closely with the Government's salvage program.

How a Steel Salesman Will Help to Expedite Your Scrap Drive.

On his new job as a scrap fieldman, in cooperation with the WPB, the steel salesman assigned to your plant will:

1. Call on a principal executive. Explain the WPB Dormant Scrap Drive objectives, and ask for your active and immediate cooperation.
2. Help, in doubtful cases, to identify dormant scrap, such as obsolete machinery, tools and equipment which are useless to war production because they are broken, worn out or not repairable.
3. Assist in facilitating the disposal of dormant scrap.

The need for scrap is URGENT! By December 31, 1942, an inventory of 7,000,000 tons must be made available to steel mills. Do *your* part by helping the steel salesman to do *his* part in this all-important drive.

HELP FOR YOUR SCRAP DRIVE

Inform your employees by showing the new sound slide film, "Let's Get in the Scrap." We'll be glad to lend you a print. Write to United States Steel Corporation, Room 1637, 436 Seventh Avenue, Pittsburgh, Pennsylvania.

USS

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York* · CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago* · COLUMBIA STEEL COMPANY, *San Francisco* · NATIONAL TUBE COMPANY, *Pittsburgh* · TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham* · SCULLY STEEL PRODUCTS COMPANY, *Chicago, Warehouse Distributors*

UNITED STATES STEEL

• A Bucyrus-Erie 29-T puts down six-inch hole for the next blast at the Galbraith mine. These holes vary from 30 to 35 feet in depth.

ping operations in the order named.

Barbara Mine

The pit of the Barbara mine covers an area 600 x 1500 feet and is the smallest of the four operations. Two Bucyrus-Erie 120-B's, one equipped with a 4-yard dipper and one with a capacity of 4½-yards, are handling the stripping and ore excavation at this time. Since all four mines are being worked continuously in consecutive eight hour shifts, these shovels are kept on the move around the clock, stopping only for regular general maintenance attention. The 120-B with the 4-yard dipper was working in ore while the other shovel was stripping overburden, which at the Barbara averages about 60 feet in depth. The maximum depth of pit at the Barbara is 140 feet with the average depth running about 100 feet.

At the end of 1942 it is estimated that about 1,900,000 cubic yards of overburden will have been removed from this mine. Of this amount it will be necessary to handle about 100,000 yards of taconite and lean ore which, besides being pretty tough stuff to handle, is low in iron content and must be considered as waste. At the end of the season about 1,200,000 tons of crude ore will have been removed since the start of the Barbara operations.

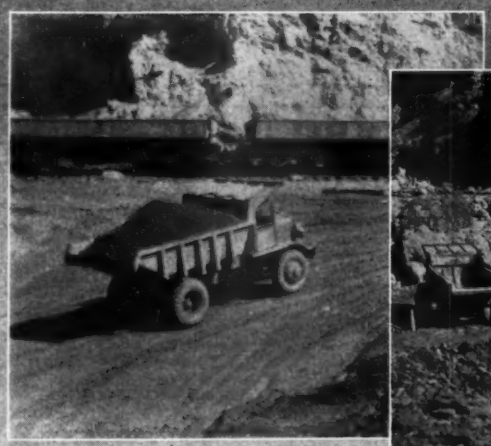
Blast hole drilling duties at this mine were being handled by two Bucyrus-Erie churn drills, a 27-T and a 29-T. Five Euclids were servicing the 4½-yard 120-B that was stripping, while three Euclids were taking ore from the 4-yard 120-B and hauling it to the conveyor hopper. The stripping shovel was averaging about 2,350 yards per eight hour shift. It is interesting to note that the unusually complete equipment performance records of Butler Brothers Company indicate that the 4-yard Bucyrus-Erie 120-B working in ore has moved 7,781,032 yards of material since 1931, working a total of 37,753 hours during that time. This average of 206 yards per hour in all types of material and under various conditions gives some idea of the performance Butler Brothers demand from their equipment.

Flow of materials at the Barbara mine is comparatively simple. Ore trucks dump their loads from a platform into a hopper equipped with a Ross retarder that feeds a 5 x 12-foot screen with 4-inch openings. Plus 4-inch material is vibrated to a rock hopper that delivers this oversize to trucks which in turn transport this waste material to a dump. Minus 4-inch material goes to a hopper below the screen that feeds the 30-inch conveyor belt transporting the ore to the washing plant. A 250-ton crude ore bin at the plant acts as a surge pocket and protects the conveyor system as well as the washing plant against short stoppages in the flow of materials.

This crude ore bin feeds another conveyor, equipped with a Weightometer to measure the amount of material passing over it, that carries the material to a 4 x 12-foot screen with 1⅝-inch openings. Plus 1⅝-inch material goes to a 4-foot cone crusher that reduces the material to minus 1¼-inches before it joins the flow to the 78-inch Akins classifier. Minus 1⅝-inch material hits a 5 x 12-foot screen with ⅜-inch openings, the minus ⅜-inch also going to the Akins classifier. Plus ⅜-inch ore is shunted directly to the concentrate bin that loads the ore cars. Material treated in the Akins classifier also winds up in this bin, while the residue is piped to a tailings pond. This is the basic flow of materials in the washing plants at all four mines. However, changes in the quality of the ore mined has resulted in some variation at the other mines to accommodate their individual requirements. O. Jalmer Anderson, super-

• Four yards of iron ore are consigned to one of the Euclids at the Harrison mine. Trucks play an important part in the company's present hauling system.

"KNOW HOW" Isn't Enough!



● Simply knowing how to operate Rear-Dump or Bottom-Dump EUCLIDS doesn't mean that the full life and efficiency of the units will be obtained unless the "know how" is carefully utilized. For example, low gears should always be used in starting, but it is a rather common practice to start in one of the higher gears simply to save a little effort. Sure, Euclids will start in the higher gears, even with heavy loads, but this causes excessive wear on the transmission, clutch and other parts, resulting in higher maintenance costs and more time off the job.

Another place where "know how" must be applied is in the use of the instruments on the dash. Those instruments provide an "x-ray" of the engine at a glance — they indicate that it is operating properly or warn that it needs attention. Unless engine operation, fuel and air pressures, etc., are carefully checked every shift before the unit goes on the job, and frequently during operation, damage to parts, inefficient performance and costly delays may occur. By using "know how" to keep the Euclids you own or operate in good condition so that they can do the jobs that bring victory closer, you'll be helping to build a better America of tomorrow.

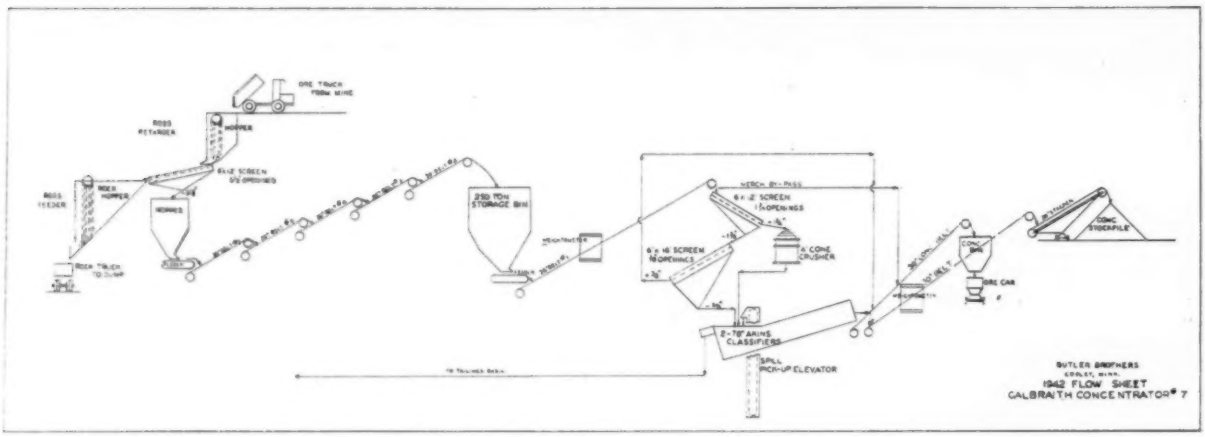
The EUCLID ROAD MACHINERY Co., CLEVELAND, OHIO

EUCLID

SELF-POWERED HAULING EQUIPMENT
For EARTH.. ROCK.. COAL.. ORE

CRAWLER WAGONS • ROTARY SCRAPERS • TAMPING ROLLERS

EUCLID THE PIONEER



• **Flow sheet of crude ore handling operations at the Galbraith concentrator. This mine's crude ore production total is expected to be 3,228,879 tons at the end of 1942.**

intendent of washing plants, directs these activities at all four mines.

Galbraith Mine

At the Galbraith mine excavating and drilling equipment is working in a pit area 1800 x 700 feet. At the end of 1942, about 3,897,744 yards of overburden will have been removed from this mine by the Butler Brothers machines. Of this overburden about 1,280,744 yards consist of taconite and paint rock. This mine's crude ore production total at the end of 1942, will be 3,228,879 tons.

Overburden at Galbraith averages about 80 feet while the pit goes to a maximum depth of 123 feet and runs to an average of 100 feet. Two Bucyrus-Erie electric 120-B shovels are also doing the material handling work at this mine. One of the 120-B's was busy stripping blasted paint rock and taconite and loading it out to a fleet of seven Euclids. The other 120-B was working in ore and kept five Euclids busy on their haul to the conveyor hopper. The 120-B in ore was averaging about 3,000 yards per eight hours, while the other 120-B was averaging about 2,540 yards per eight hours in loading out the overburden.

Vertical blast holes at all four of the mines are put down exclusively by Bucyrus-Erie drills and at the Galbraith, a 27-T and a 29-T were putting down holes for the next blast. These 6-inch holes varied from 30 to 35 feet in depth. In a typical blast some 9,900 pounds of powder were used to break up 44,600 cubic yards of paint rock and taconite. The company's experience indicates about five yards of material moved per pound of powder breaking up taconite and paint rock formations. No holes have been sprung at a Butler Brothers mine for ten years, since it is the policy of the company to avoid this procedure as a safety hazard.

Horizontal drilling, found to be advantageous in some formations, is handled by a Parmanco horizontal drill. Occasional secondary blasting is accomplished with the use of a portable Ingersoll-Rand compressor and jackhammers.

Flow of materials at the Galbraith mine is about the same as the Barbara set-up.

Kevin Mine

At the Kevin mine, men and machines will have moved 4,100,000 cubic yards of overburden at the end of 1942. In this amount is included 730,000 yards of paint rock and taconite. Overburden at the Kevin is comparatively light, averaging about 25 feet. This mine's 2100 x 2000-foot pit goes to a maximum depth of 135 feet and averages about 80 feet in depth. At the end of the year this property will have produced about 6,800,000 tons of crude ore.

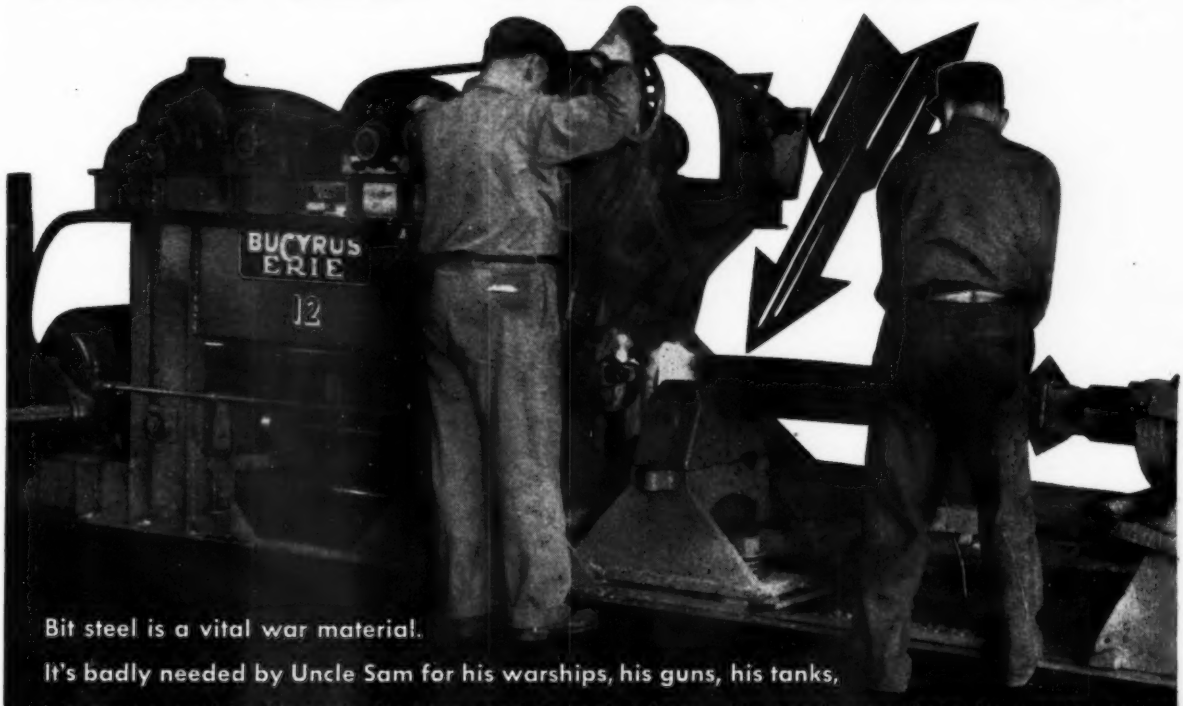
Stripping operations at the Kevin are being handled by a Marion 4160 equipped with a 4-yard dipper. This machine was loading out paint rock overburden to seven Euclid trucks at the rate of about 2500 yards per eight hour shift.

Working in ore, a Bucyrus-Erie 120-B equipped with a 4-yard dipper was loading out material to four Euclids averaging about 2600 yards per eight hour shift. Ore from the Kevin mine is treated at the company's Patrick concentrator. Although the flow of materials from the mine is the same as in the mines previously described, the Kevin does have one innovation and that is an interesting "drive over pocket" arrangement to accommodate trucks hauling ore to the conveyor pocket.

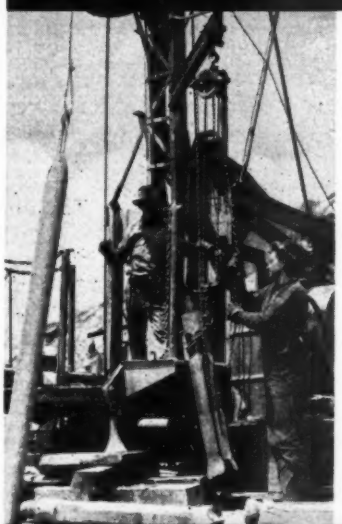
This arrangement consists of a steel reinforced driveway over the entire top of the screening plant. An ingenious draw bridge over the pocket proper constructed of heavy plates reinforced with I-beams is built in two sections that roll away in opposite directions. When the draw bridge is closed the truck drives out over the bin; its front wheels climbing a raised curved portion of the platform to assist the truck in its rear dumping action. When the truck is in place the draw bridge is opened by compressed air and the truck driver receives the signal to dump his load. Red and green traffic control lights insure the safety of the operation, giving the truck drivers the signal to drive on the platform as well as to dump their loads. Manual control is being used at present, but the company plans to install electric eyes to make the operation of the draw bridge, which can handle one truck per minute, entirely automatic.

The improvement of this type of platform over the ordinary

WATCH YOUR BITS!



Bit steel is a vital war material.
It's badly needed by Uncle Sam for his warships, his guns, his tanks, his armor, and in the tools that are used to make them. He needs your help; he wants you to get the utmost possible use of the steel you have on hand. You can give him this help by keeping your bits properly dressed so you'll get maximum footage drilled and per sharpening.



SOME BIT-SHARPENING "DONT'S" TO REMEMBER

DON'T heat the bit far above the magnetic stage for hardening as the grain of the steel will then become much coarser and lose its toughness.

DON'T heat the bit very far above the critical point and then wait for the temperature to drop to the proper point; hardening in this manner is detrimental to the steel.

DON'T let bit "soak" in the fire as this will damage the steel.

DON'T throw water on the bit to hasten the cooling.

DON'T doubt the accuracy of the magnet in detecting the critical temperature, and in hardening, always quench the bit, regardless of the color which may appear, as soon as it is heated just above the point where the magnet ceases to attract. In bright light or sun the steel will look black even when at a temperature which would show quite a bright red color in a dark room or on a cloudy day. A little practice in the use of the magnet will enable the operator to detect the proper hardening temperature regardless of the light conditions.

H 40

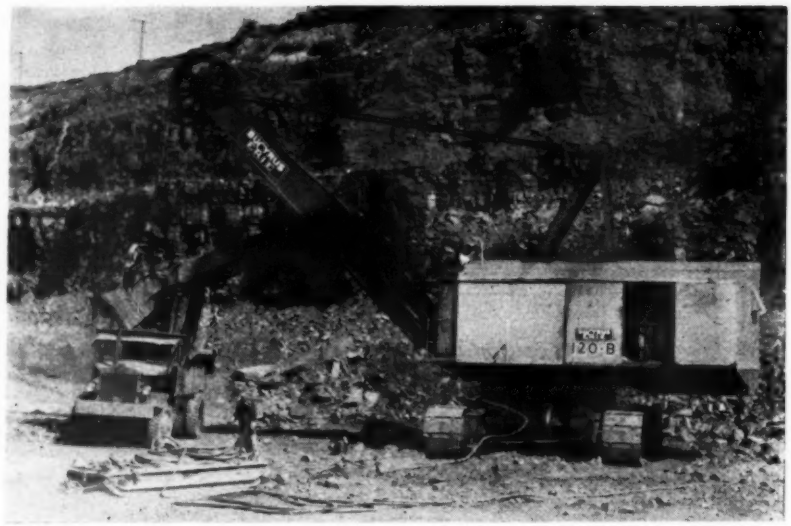
DRILL FOR ★ ★ ★ VICTORY ★

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

back-in arrangement is apparent when you consider that truck drivers average as many as 100 "back-ins" per eight hour shift. The net result is not only a saving in time and wear on equipment, but a very definite improvement in back and neck strain and general physical and mental fatigue of the truck drivers through elimination of the back-up.

In addition to the ore separation equipment found at the plants previously mentioned, the Kevin mine has an 8-foot Dorr rake classifier as well as a series of McLanahan stone jigs that provide the plant with complete washing and jigging facilities.



• Stripping blasted paint rock and taconite keeps this Bucyrus-Erie 120-B busy at the Galbraith mine. Note sled to facilitate handling electric cable.

Harrison Mine

The largest producer of the Butler Brothers open pit mines currently in operation, is the Harrison. At the end of 1942, this mine will have produced 9,560,000 tons of crude ore. To free this amount of ore a total of 4,267,000 cubic yards of overburden will be removed. About 775,000 cubic yards of taconite and paint rock are included in this figure.

Pit area at the Harrison is 1200 x 2400 feet and the overburden depth averages about 40 feet. The pit reaches a maximum depth of 183 feet and averages about 155 feet in depth.

In this largest and deepest of the Butler Brothers pits, a Bucyrus-Erie 120-B electric equipped with a 4-yard dipper and a Marion 4160 also electrically-powered and swinging a 4-yard dipper, were working in ore loading out to seven Euclids.

Two Bucyrus-Erie 29-T blast hole drills were punching holes through a taconite and paint rock ledge in preparation for the next blast. As in the mines previously visited, the Harrison pit floor received constant grading attentions from a Caterpillar auto patrol, while a Caterpillar tractor equipped with a LaPlant-Choate bulldozer cleaned up around the shovels.

At the Harrison mine, rail operation is making its last stand, as the company still uses rail haul from a crude ore surge bin at the edge of the pit to transport the ore to the Harrison washing plant which is some distance from the pit now being worked. However, in the pit the usual flow of materials is observed, trucks hauling ore from the shovels to a dumping platform feeding a conveyor belt that transports the ore out to the crude ore surge bin that in turn feeds the railway cars.

The Harrison washing plant is the largest and most completely equipped of the four visited. It has complete washing, jigging, and hi-density facilities for the concentration of ore.

At an old sludge basin near the Harrison plant an interesting tailings recovery operation was observed. Improvement of ore benefication processes having made it feasible to rework these old tailings, a Bucyrus-Erie 43-B equipped with a 2-yard dipper was loading out dry sludge to a traveling hopper over a 30-inch conveyor belt that carried it back at the rate of 200 tons per hour to the washing plant that once sent it out as waste. This operation has been most successful and the company is experiencing 50 per cent recovery of iron ore from the old tailings.

In back of the day-by-day operating efficiency of Butler Brothers mines is a complete maintenance program under the supervision of Gust Weggum, master mechanic. Hub of this efficient program is the complete maintenance shop located at Cooley. Housing a floor space 90 x 220 feet in area, the shop employs 125 men in general overhaul, welding, and blacksmithing activities.

Taking care of the shovels, trucks, drills and a large group of miscellaneous equipment keeps the shop busy around the clock during these days of "all out" effort.

Master Mechanic Weggum's major responsibility is the upkeep of the fleet of 42 Euclid trucks, the six Bucyrus-Erie 120-B's and the two Marion 4160's, as well as five smaller excavators of various makes running from one to two yards in size. Repointing of shovel dipper teeth which vary from eight to 24 hours life in the abrasive iron ore and taconite rock being handled keeps the welding department pretty busy. The diesel engines in the Euclids give about 4,000 to 7,000 hours of use before they are sent to the shop for complete overhaul.

Each machine in the fleet of seven Bucyrus-Erie blast hole drills, two 27-T's and five 29-T's, is given a thorough overhauling about every two years. The years of faithful service these machines have put in attest to the value of this regular maintenance attention. Drill bits must be sharpened every six inches to ten feet of hole depending, of course, on the hardness of the rock being drilled. Sharpening of these bits is one of

the major duties of the blacksmith shop.

Among the auxiliary equipment that must be serviced are nine Caterpillar D-8's, seven La-Plant-Choate bulldozers, three Caterpillar auto patrols, and two Athey Loaders. The shop's complete tire vulcanizing repair facilities have also assumed new importance during these present days of tire restrictions.

Besides its equipment maintenance responsibilities, the shop handles all the repairs at Butler Brothers five iron ore concentrating plants and four screening plants. Much of the structural steel in these plants was "tailored" to the company's particular needs by the maintenance shop.

Amplifying these maintenance activities, are field service garages constructed at each mine for fueling and lubricating services administered to the Euclid trucks.

Under the guidance of H. F. Stewart, safety and efficiency engineer, the company has made its many changes in production procedure with a minimum of lost time accidents. The company policy that safety and job efficiency are practically synonymous has paid dividends in the excellent safety record being experienced by the company.

Excellent Employee Program

Butler Brothers Company has gone a step farther than most mining companies in developing its employer-employee relationship. Faced with the problem, under normal conditions, of an annual winter shutdown when ice prevents the ore boats on the Great Lakes from navigating, Butler Brothers has attempted to keep its men busy during the slack season as much as possible. In the winter of 1941, the company moved 4,000,000 yards of overburden in following out this plan.

Under the direction of M. W. Brink, industrial relations representative, the company holds educational classes in welding, washing plant practice, geology, electricity, mining engineering, construction drawing, diesel engines, and welding and cutting during the slack winter months. The bond between company and employees is further cemented by a house organ "The Butler Miner" which is sent to every employee each month. Social activities are made available to all employees by the Butler Brothers' Men's Club. Employee welfare is assured by company-backed medical, hospitalization, and insurance plans available to all.

The engineering crew at Butler Brothers is under the competent direction of Hiram E. Reese, chief engineer. This group plays an important part in the exploration and development of the company's mining properties. The engineers' major jobs are: the performance of general engineering work, supervision of explorations, and planning and supervising all construction.

That's the story behind a company playing an important part in supplying Uncle Sam with the basic raw material of war. Iron ore, three and one-half million tons of it, is the answer of the Butler Brothers organization to the Axis challenge.

HOW can time be saved? How can we make the best use of our raw materials now so urgently needed for so many purposes?

With Wire Rope the answer is in using the quality, construction and type that can be installed the quickest . . . that will deliver the most hours of work per pound of steel.

You can depend on Preformed "Hercules" (Red-Strand) Wire Rope for maximum efficiency. As it is easier to handle, it can be installed quicker. In addition to saving time, its longer service saves steel for other vital uses.

As Preformed "HERCULES" is furnished in both Round Strand and Flattened Strand constructions, there is, in this one grade, a right rope for every heavy duty purpose. You will like its smooth spooling . . . its stamina . . . its dependability.

In order to help all wire rope users obtain maximum service from their wire rope, we publish an illustrated booklet "Practical Information on the Use and Care of Wire Rope". We would be glad to send a complimentary copy to anyone interested.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
CHICAGO • • 810 W. Washington Blvd.
DENVER • • • 1554 Wazee Street
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PORTLAND • • 914 N. W. 14th Avenue
SEATTLE • • 3410 First Avenue South

NOT in the *Contract*

A young matron of our acquaintance taking first aid training had reached the resuscitation stage. One evening on a darkened street she observed a man sprawled face downward. "Aha," thought the young matron, "Providence has sent me hither to minister to this poor unfortunate." Parking her car she rushed over and began the resuscitation treatment. Presently he stirred and looked up. "Lady, I don't know what the hell you're up to, but I wish you'd quit tickling me. I'm holding a lantern for this guy working down in this manhole."

Co-ed: I had a date with an absent-minded professor last night.

Girl Friend: How do you know he's absent-minded?

Co-ed: Well, he must be, He gave me a low mark on my history test this morning.

The Queen Bee is a hardy soul—
She thumbs her nose at birth-control;
Which is the reason, beyond a doubt,
There's so many sons of bees about.

Rastus: "Yo' done said yo' could lick me?"

Mose: "Uhuh, Ah sho' did, big boy. Want me to demonstrate?"

Rastus: "No, indeedy. A's jes' gatherin' statistics."

Two young ladies were walking down Fifth Avenue. Suddenly one cut loose with a piercing shriek. "Look," she cried in amazement.

"What's so terrible," asked her friend. "That's only a midget."

"Thank God," said the other girl, greatly relieved. "I thought they were rationing men."

Have you heard about the two Japanese statesmen who jumped out of a hotel window because they found an American vessel under the bed?

The club bore was boasting of his family's patriotism.

"I'm joining the R.A.F. next week," he stated. "My father fought in the last war, and my grandfather fought in the Boer War. My great-grandfather, I've been told fought in the Zulu War . . ."

"Really!" drawled a thoroughly bored listener. "On which side?"

"This girl's fresh from the country, and it's up to us to show her the difference between right and wrong."

"O.K., pal, you teach her what's right."

And then of course, there was the optician's daughter. Two glasses and she made a spectacle of herself.

Mr. Check says:

J&L WIRE ROPE

"J&L PERMASET Pre-formed Wire Rope gives extra service."

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
OILMORE WIRE ROPE DIVISION • PITTSBURGH & MUNCY, PA.

NEED A BIG Trailer?

La Crosse Makes Them Up To 200 Ton Capacity

WRITE OR WIRE

LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U.S.A.

HAYWARD BUCKETS

USE RIGHT BUCKET FOR THE JOB

Hayward makes all four — clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.

THE HAYWARD COMPANY
52-54 Church Street
New York, N. Y.

Notes from the manufacturers

The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, recently announced the awards in the nation-wide 2½-year $200,000 scientific welding study program sponsored by the foundation. A 2½-year welding study, known as the "$200,000 Industrial Progress Award Program" brought forth reports of welding progress prepared by executives, engineers, designers, architects, production officials, and others throughout the industrial field. The study indicated a possibility of tremendous savings in costs and man hours for production of products by arc welding for both war and peace.

Independent Pneumatic Tool Company, Aurora, Illinois, announces that in honor of the company's Army and Navy "E" award, the city council of Aurora proclaimed October 8, as the city's Army-Navy Day. The entire community participated in a series of civic events which culminated in the presentation of the "E" banner and buttons to the employees of the company. Independent Pneumatic Tool Company also announces new locations of its branch offices at Boston, Massachusetts and Birmingham, Alabama. The Boston office, now managed by Mr. V. G. Turner, has moved to 78 Brookline Avenue, and the Birmingham office has moved into its own new, modern home at 1411 North Third Avenue.

The Wellman Engineering Company, Cleveland, Ohio, announces that on October 12, they were presented the Army and Navy "E" award for excellence in production.

Westinghouse Electric Company, East Pittsburgh, Pennsylvania, announces that five Pittsburgh area plants of the company were recently presented with Army and Navy "E" pennants.

Chain Belt Company, Milwaukee, Wisconsin, announces it has been presented the Army and Navy "E" award on September 19, in a ceremony at the plant.

General Electric Company recently announced that WPB Chairman Donald M. Nelson has appointed Charles E. Wilson, company president, a vice chairman of the WPB. Mr. Wilson, who will serve on a dollar a year basis, has been president of General Electric Company since 1940.

The Universal Crusher Company, a Delaware corporation, with factories and general offices at Cedar Rapids, Iowa, on October 1, changed the name of the company to The Universal Engineering Company, organized under the laws of the state of Iowa. A. W. Daniels is president, H. F. Rikoff, secretary-treasurer, A. H. Sargent, vice president, L. S. Hackney, sales manager, and L. W. Dunlap, assistant to the president.

Worthington Pump and Machinery Corporation announces the appointment of Joseph T. Wright as manager of the Compressor and Tool Division at its Holyoke, Massachusetts works. Mr. Wright has had broad experience in the machinery field.

POSITIONS WANTED

Address all box numbers c/o EXCAVATING ENGINEER South Milwaukee, Wis.

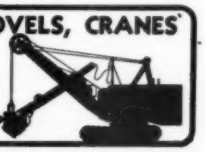
FOREMAN-SUPERINTENDENT

Foreman or superintendent, 10 years experienced on general construction, sewer and water systems, concrete masonry, foundations, coffer dams, piling, clearing, grubbing, grading, bridge and culvert work, sober, American citizen, best of references. Available at once. Box 9199

TO ADVERTISE: All advertising in this section is payable in advance. Rate: 60c per line, or $7.20 per inch of 12 lines. Minimum charge $2.40. No discounts; no commissions. If no change in copy is desired, three continuous insertions are offered for the price of two. Read these instructions carefully. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Count your own copy to save delay. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January issue closes December 15th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES AND DRAGLINES
2½ YDS. AND UP



STRIPPER AND LOADER

325-B BUCYRUS-ERIE steam stripper truck mounted, in excellent condition. 80-ft. boom, 54-ft. sticks, 6 or 8 yd. bucket. **50-B rebuilt** 2-yd. loader. Extra parts for both machines. Sell or lease to responsible parties. Box 2911

MARION 7200 Diesel powered walking dragline. 100-foot boom. 5 cu. yd. bucket. Only two years old. Located California. Box 2906

QUARRY SHOVELS

TWO 4-YARD full revolving electric quarry shovels. Now operating. Can be inspected. Available promptly. Midwest. Box 2913

If you do not find what you want listed — write us

EXCAVATING engineer
South Milwaukee, Wisconsin

BARGAIN

30-B BUCYRUS both shovel and dragline booms, Atlas Imperial Heavy Duty Diesel Motor, Electric light plant, two dragline buckets. Located on Canadian National Railway near Edmonton. P. O. Box 231, Edmonton, Alberta, Canada.

COAL STRIPPING UNIT

200-B BUCYRUS-ERIE steam stripper mounted on caterpillars. 75-ft. boom, 60-ft. sticks, 6-yd. capacity. This machine new 1936. 50-B rebuilt loader, steam power, 30-ft. boom, 22-ft. sticks, 2-yd. bucket. Sell or will lease to financially responsible parties. Box 2910

SMALL SHOVELS, CRANES AND DRAGLINES
UP TO 2½ YDS.

FOR SALE

BUCYRUS MODEL 10-B machine with dragline boom, ½-yard dragline bucket, pull shovel boom, ⅝ yard pull shovel bucket, ⅜ yard clamshell bucket, trailer and lot spare parts. Machine located at West Memphis, Ar. Ready to run.
West Memphis Const. Co. Hillhouse, Miss.

FOR SALE

MARION MODEL 125 electric shovel, crawler mounted. 55' boom, 36' handle. 2½-yard bucket. For power supply 3 phase. 60 cycle. 2300 volts. Box 2854

BUCYRUS-ERIE SHOVEL, 1 yd., GA2, gas air, high lift boom. Running condition. Located in eastern Ohio. Excellent bargain for $2000. Ridge Coal Co., Box 237, Sugarcreek, Ohio.

TRACTORS, SCRAPERS GRADERS, ETC.

GRADER & TRACTOR

Cat. 50-66 grader, hand control, 4 steel wheels, 12 ft. blade. Cat. 60 gas tractor, new track assembly. Intern'l TD40 Diesel tractor, wide gauge. This equipment is completely rebuilt, cleaned and painted, new upholstery and ready to go now. Clifford Waterhouse, Jackson, Miss. Tel. 2-0617.

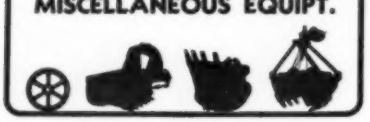
FOR SALE—Used Bucyrus-Erie Model H-44 Scraper. Bargain Price. Condition excellent. Tires good. Inquire Box 2902.

CAT 60 TRACTOR, 3 EUCLID 6-yard and one Euclid 8-yard crawler mounted bottom dump wagons. Good condition. Industrial Salvage Mat'l Co., Milwaukee. Tel. Sheridan 0414.

One M-51 4½ yd. Bucyrus-Erie 4-Wheel Scraper, complete with 6—9:00x20 ten ply tires in good condition, and MV-15 Bucyrus-Erie single drum Winch and adaptor for use with TD-40 International Trac-TracTor.

One P-14 Winch for above Scraper for use with a TD-14 International TracTracTor.
Box 2903

MISCELLANEOUS EQUIPT.



FOR SALE

Monighan 3-T Walker dragline, elec., 70' boom.
Allis-Chalmers 18" Gates No. 8-K gyratory crusher, manganese fitted, No. 5405, Tex-rope; A-1.
Brownhoist 20-ton locomotive crane, steam, std. ga., 8-wheel, 49' boom, ASME boiler, MCB, being completely rebuilt, ship Nov.
Locomotives, gasoline, narrow 36" & 30" gauge, 7, 8, 10 tons. Also, four steam saddletank dinkeys, 36" ga., 19, 18 & 16½ tons.
Bucyrus-Erie 1¼-yd. GA-2 gas-air shovel.
Bucyrus 80-B high lift steam shovel, on cats.
Bucyrus 50-B shovel front attachment, (west).

H. Y. SMITH CO.
828 N. Broadway Milwaukee, Wis.

FOR SALE—75' boom, 52' handle, 3 yard dipper steam stripping shovel mounted on 4-wheel equalized trucks reasonably priced central location. Box 2840

FOR SALE: 2 yard dipper with new front, new bail lugs, new side plates, and is in A1 condition. This is a heavy rock dipper complete with bail but without bail pins or tooth bases.
Box 2891

2 MODEL L A-C TRACTORS silent geared nigger-head winches; 27-E Rex Paver; Isaacson & Gar Wood Bulldozers; Cletrac 55 with Isaacson Hydraulic bulldozer; 5 complete hydraulic dumps 2 and 2½ yards; 5 Hercules JXC Gas Motors; 2 Red Seal Continental motors; 1 Keystone ½ yard backhoe, can be used for stationary derrick, price $750; five forward speed transmissions—BrownLipe, Clark, Sols. 95 Flat Shoals Avenue, S.E., Atlanta, Ga.

FOR SALE

THOR AIR COMPRESSOR — Mounted on steel wheels pulls two hammers. Good condition. $700.
Four-inch Centrifugal Le Roy pump mounted on steel wheels. Good condition. $300.
Fairbanks-Morse Pitless 10-ton scales 4 years old. $200.

Homer W. Seed, 124 N. 1st
Boonville, Indiana

LOCOMOTIVE

40-TON VULCAN Saddle Tank Locomotive. Standard gauge. A.S.M.E. boiler good for 190 lbs. Rebuilt and ready to go.

MACKINTOSH ENGINEERING CO.
2907 Library Avenue, Cleveland, Ohio.

4-TRACK TIPPLE

Complete 4-track coal tipple and siding, 40-car per day capacity. Bargain. Box 2912

AMERICAN DITCHER—7x8 machine for operation on flat car or standard gauge track. Equipped 43x91" submerged flue type boiler, hoisting drum 14x22¾", pull-in drum 14x22¾", boom drum 10½x11" long. Machine in good condition, available immediately. Rib Lake Lumber Co., Rib Lake, Wis.

RUTH DREDGER H-L minus 60 h.p. Waukesha gasoline engine power plant. Purchased new 1929 and used about one year. Machine equipped with 50-foot extension and 17-bucket elevator. Main crawler 16'0" long. Track links 8" pitch, 40" long. Overall length of dredger 30'0". This type dredger is particularly adapted for cleaning, digging, enlarging drainage canals of not more than 40 feet in width. For sale by receiver. Any reasonable offer will be accepted. Location Florida east coast.
Box 2901

SPREADER PLOW, Bucyrus-Erie Type 50. Like new, used only for short time. Located Middle West. Box 2916

If you do not find what you want listed — write us

EXCAVATING engineer

South Milwaukee, Wisconsin

FOR SALE—Special Electric Tower Excavator equipped with grizzly and crusher for shaft and underground belt disposal. Head Tower on flanged wheels and rails, and arranged for full rotation. Tail tower on caterpillars for operation at 700' radius at any point within a circle. Electrical equipment 3 phase, 60 cycle, 2300 volts Ward-Leonard with 200 hp Introduction motor. Box 2878

For Sale
Surplus Equipment

1—60 ft. dragline boom built for use with 43-B diesel Bucyrus shovel. Practically new.

1—Dragline bucket for use with above. Depth 34 in. Width 52 in. from cutting lip to back of rounded plate 60 inc. Good condition. Box 2896

FOR SALE

7—Hercules Standard Gas Engines—Model "WXC" 6 cylinders—4" bore x 4½" stroke
2—Hercules First Altitude Gas Engines—Model "WXC—3" 6 cylinders—4¼" bore x 4½" stroke.
4—Hercules Second Altitude Gas Engines—Model "WXC—3" 6 cylinders—4¼" bore x 4½" stroke.

All engines include carburetor, oil filtrator and mounting, governor manual control, fan assembly with belt and fan bracket, exhaust manifold, starting crank assembly, starter ring gear on flywheel for mounting electrical equipment, water thermostat, fuel pump with hand primer, magneto, spark plugs, set of wiring and miscellaneous tools.

Wire — Write — Telephone

BUCYRUS-ERIE COMPANY
Parts Department
SOUTH MILWAUKEE, WIS.

MACHINERY—MOTORS—CRUSHING PLANT EQUIPMENT

Belt Conveyors—Electric Screens, Elevators and Crushers
3—100KVA Transformers
15—Electric motors
Electric Pumping Equipment
65-ton Elec. American Hoist with Slewer
Drilling Equipment
Dust Collector System
2, 3, 4, 5, and 6-inch Used Pipe
6-inch Used Railroad Spikes

Write for inventory and prices.

The Barjohn Corp., Mellen, Wis.

BARGAINS

⅜ cu. yd.—10-B—Shovel dipper
* ½ cu. yd.—16-B—Drag shovel dipper
* ½ cu. yd—18-B—Skimmer scoop dipper
¾ cu. yd.—20-B—Shovel dipper
¾ cu. yd.—20-B—Drag shovel dipper
⅞ cu. yd.—32-B—Shovel dipper
1¼ cu. yd.—33-B—Shovel dipper
1¼ cu. yd.—GA-3—Shovel dipper
1¼ cu. yd.—{41-B, 42-B, E-2}—Shovel dipper
1½ cu. yd.—{41-B, 42-B, E-2}—Shovel dipper
*1⅝ cu. yd.—37-B—Shovel dipper
2 cu. yd.—75-B—Shovel dipper
2¼ cu. yd.—50-B—Shovel dipper
2¼ cu. yd.—75-B—Shovel dipper
3¼ cu. yd.—75-B—Coal dipper
5 cu. yd.—120-B—Shovel dipper (used)
6 cu. yd.—{200-B, 225-B, 320-B}—Shovel dipper
8 cu. yd.—320-B—Shovel dipper (used)

Asterisk (*) denotes more than one such item available.

"FOR BUCYRUS-ERIE EXCAVATORS ONLY."

Bucyrus-Erie Company
South Milwaukee, Wis.

WANTED

SHOVEL DIPPER for Model 1030 Bucyrus-Erie Gas Shovel. Box 2915

WILL TRADE

Have Bucyrus-Erie Model S-108 equipped with 6—1200x20—14 ply tires in excellent condition. Will trade for Bucyrus-Erie model S-90 Scraper equipped with either 6—1100x20 or 6—1300x20 tires. Reply giving serial number, location and advise condition of tire equipment.
Box 2894

WANTED

In market for trencher that will make width of at least 12"; and Caterpillar with side-boom, back filler and other type equipment making one unit for pipe lines.

JOS. GREENSPON'S SON PIPE CORP.
National Stock Yards (St. Clair County), Ill.

WANTED

COMPLETE SET FAIRLEADS for Bucyrus-Erie 15-B dragline. Write or wire.
Box 2905